# Storport Miniport Driver

*Version 2.20*

*for Windows Server 2003*

*Windows Server 2008*

*Server Core Installation Option of Windows 2008*

***User Manual***

**P003588-01A Rev. A**

**Critical Connectivity Solutions™**

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# Installation

## Introduction

AutoPilot Installer® for Emulex® Storport Miniport drivers provides installation options that include simple installations with a few mouse clicks, custom unattended installations that use predefined script files and text-only installations. AutoPilot Installer is included with Emulex drivers and utilities in Windows executable files (driver kit installers) that you can download from the Emulex Web site.

There are two types of driver kits that can install the Emulex Storport Miniport driver and utilities:

- Full Installation Driver kit (full driver kit) - Includes the Emulex Storport Miniport driver and the complete HBAnyware® utility set, including a Graphical User Interface (GUI) and a Command Line Interface (CLI). The full driver kit also provides an option to create AutoPilot Installer kits that you can customize and distribute on your network. Although the full driver kit will not install on the Server Core installation option of Windows Server 2008 (Server Core), it can be used to create kits for those platforms.
- Core Installation Driver kit (core driver kit) - Includes the Emulex Storport Miniport driver and the HBAnyware utility CLI, but not the HBAnyware utility GUI. The core driver kit is required for use with Server Core platforms. You can only customize the core driver kit on the system where it is installed. It cannot be used to create AutoPilot Installer Kits for other platforms.

Run one of the driver kit installers to extract all of the software needed for an installation, then complete the installation using AutoPilot Installer. You can install a driver by any of the following methods:

**Note:** These installation methods are not mutually exclusive.

**Hardware-first installation.** At least one Emulex adapter is installed before you install the Emulex drivers and utilities.

**Software-first installation**. You can install drivers and utilities using AutoPilot Installer prior to the installation of any adapters. You do not need to specify the model of any adapters to be installed later. The appropriate drivers and utilities automatically load when you install the adapters.

**Utility Only update**. If the Storport Miniport driver in the driver kit is the same version as what is already installed on the system, you can reinstall or update the previously installed utility without reinstalling the Storport Miniport driver.

**Text-Only installation**. Text-based installation mode is used automatically when AutoPilot Installer is run on a Server Core system.

**Network installation.** You can place the driver kit installers on a shared network drive and install them across your local area network (LAN). You can use the full driver kit to create your own AutoPilot Installer kits for network-based installation. Network-based installation is often used in conjunction with unattended installation and scripting. This allows you to configure and install the same driver and utility versions on all the hosts in a SAN.

**Unattended installation.** You can run the driver kit installers and AutoPilot Installer with no user interaction from a command line or script. Unattended installation works for both hardware-first and software-first installations and with both the full driver kit and the core driver kit. An unattended installation operates in silent mode (sometimes referred to as quiet mode) and creates an extensive report file with installation status.

# Important Considerations

## New in This Release

- ExtTransferSize parameter has been added to improve performance on tape devices supporting a larger block size.

## Changing Driver Types

If you currently use a SCSIport Miniport or FC Port driver, the driver will be replaced when you install Storport Miniport driver version 2.20. Storport Miniport driver version 2.20 will be installed for all HBAs on the server. You will also lose your customized driver parameters, persistent bindings, LUN masking and LUN mapping. The default parameters set with AutoPilot Installer will usually be the best options. However, you may want to note your current settings before you install Storport Miniport driver version 2.20. After the installation, you can then update your customized driver parameters.

**Note:** This update process can leave files associated with old driver kits on your system. After running AutoPilot Installer and restarting your system, you may be required to uninstall old driver or utility program entries. Follow the procedures in the "Uninstalling Programs" section in the Storport Miniport driver User Manual. Ensure you delete only previous driver and utility versions.

## Minimum Software Requirements

AutoPilot Installer will not let you perform an installation if the minimum Windows service pack or Microsoft Storport driver update is not installed.

# Storport Miniport Driver Information

Prerequisites

- One of the following operating systems:
  - Windows Server 2003 SP2 running on an x86, x64 or Itanium server.
  - Windows Server 2008 running on an x86, x64 or Itanium server.
  - Server Core installation option of Windows Server 2008 running on an x86 or x64 server.
  - Windows Vista SP1 running on an x86 or x64 platform.
- Minimum 512 MB memory.
- See the Emulex Web site for required updates to the Microsoft Storport driver.

Compatibility

- The Emulex Storport Miniport driver is compatible with the following Emulex adapters:
  - LP21002 and LP21000 converged network adapters (CNAs) (minimum firmware version 1.00a4)

    **Note:** The LP21002 and LP21000 CNAs do not support Windows Server 2003/2008 on Itanium servers
  - LPe12002, LPe12000 and LPe1250 adapters (minimum firmware version 1.00a9)
  - LPe11004, LPe11002, LPe11000 and LPe1150 adapters (minimum firmware version 2.72a2)
  - LP11002, LP11000 and LP1150 adapters (minimum firmware version 2.72a2)

  - LP10000DC, LP10000, LP1050DC and LP1050 adapters (minimum firmware version 1.91a5)
  - LP10000ExDC and LP1050Ex adapters (minimum firmware 1.91a5)
  - LP9802DC, LP9802 and LP982 adapters (minimum firmware version 1.91a5)
  - LP9402DC, LP9002DC, LP9002L, LP9000 & LP952L adapters (minimum firmware version 3.93a0)
- x86 BootBIOS - LP21002 and LP21000, minimum version 2.02a1; LPe12002 LPe12000 and LPe1250, minimum version 2.01a2; all other adapter models, minimum version 1.71a0.
- EFIBoot - (LP21002 and LP21000 are not supported) LPe12002, LPe12000 and LPe1250, minimum version 4.00a1; all other adapter models, minimum 3.11a5.
- This version of the driver is compatible with version 4.1 of the HBAnyware utility. This is the version of HBAnyware that is included in the driver kit. Version 4.1 of the HBAnyware utility is not compatible with earlier versions of the Emulex Storport Miniport driver on the same server.

# Driver Kit Installer Overview

The driver kit installer is an executable file that self-extracts and copies the following software onto your system:

- AutoPilot Installer - Installs drivers and runs the HBAnyware utilities installer.
- Storport Miniport driver - Manages communication and data transfer between applications and I/O devices, using Emulex adapters as agents. There are separate drivers for Emulex host bus adapters (HBAs) and converged network adapters (CNAs).
- ElxPlus driver - Supports the HBAnyware utility, persistent binding and LUN mapping and masking.
- HBAnyware utility installer- Installs HBAnyware utilities and services. These monitor and perform configuration tasks on remote and local adapters.
- HBAnyware Security Configurator - Controls which HBAnyware systems can remotely access and manage adapters on other systems in a Storage Area Network (SAN).

After the driver kit is installed, you have three options:

- Automatically run AutoPilot Installer immediately. This is the default option. See page 6 for more information.
- Explicitly run AutoPilot Installer later on your system. See page 6 for more information.
- Create an AutoPilot Installer kit that can be customized and used to run AutoPilot Installer on your system or another system. See page 7 for more information.

**Note:** The third option is only available when installing the full driver kit. While the full driver kit cannot be installed on Server Core systems, it can be used to create AutoPilot Installer Kits for those systems.

## Files Installed by the Driver Kit Installer

The driver kit installer copies the AutoPilot Installer Files to your system. By default, the files necessary to run AutoPilot Installer are copied to:

`c:\Program Files\Emulex\AutoPilot Installer`.

When you select the **Create AutoPilot Installer Kits** option, the files are copied by default to an Emulex folder in your Documents folder.

**Table 1: AutoPilot Installer Program Files**

| Folder | Description |
|---|---|
| AutoPilot Installer | This folder contains files necessary to run the AutoPilot Installer, including:<br>• APInstall.exe - Executable file for the AutoPilot Installer.<br>• APInstall.cfg - Default configuration file for the AutoPilot Installer. |
| Drivers\Storport | This folder contains the files necessary to install the drivers. |
| Utilities | This folder contains files necessary to install the HBAnyware utilities. |
| reports | AutoPilot Installer reports are placed here by default. Reports can be placed in a different location using the ReportLocation parameter. |

# AutoPilot Installer Overview

AutoPilot Installer runs after the driver kit is installed. It can be run by:

- Continuing the installation process after the driver kit installation completes.
- Interactive installation at a later time.
- Unattended installation.

## AutoPilot Installer Features

- Command line functionality - Initiates an installation from a command prompt or script. Configuration settings can be specified on the command line.
- Compatibility - Verifies that the driver to be installed is compatible with the operating system and platform.
- Driver and utility updates - Installs and updates drivers and utilities.
- Multiple adapter installation capability - Installs drivers on multiple adapters, alleviating the need to manually install the same driver on all adapters in the system.
- Driver diagnostics - Determines whether the driver is operating properly.
- Silent installation mode - Suppresses all screen output (necessary for unattended installation).
- Utility-only installation - AutoPilot Installer can skip driver installation if the driver on the system is the same as the driver AutoPilot Installer is about to install. This functionality is available for attended and unattended installations.

- Management Mode Setup - Parameters in the AutoPilot Installer configuration file or on the command line determine if you can manage adapters locally and remotely, and if the user can change the remote management options once the utility is installed.

**Note:** See “Software Configuration Parameters” on page 17 in the Unattended Installation topic for more information. Management mode parameters govern both attended and unattended installations.

## Text-Only Installation

Text-based installation mode is used automatically when AutoPilot Installer runs on a server with the Server Core installation option of Windows Server 2008. During text-based installations, AutoPilot Installer interacts through a command prompt window. AutoPilot Installer notifies you when the driver is installed and also gives you a chance to abort the installation.

**Table 2: Supported Installation Modes**

| Installation Kit | Full Windows System | Server Core System |
|---|---|---|
| Full Driver Kit | GUI Install<br>Silent Install | Not Allowed |
| Core Driver Kit | GUI Install<br>Silent Install | Text-based Install<br>Silent Install |

Whether it is launched from the command line or started programmatically, Windows always starts AutoPilot Installer as a separate stand-alone task. This means that AutoPilot Installer will have its own command prompt window and cannot access others.

# Installing the Driver Kit

To install either the full driver kit or the core driver kit:

1. Download the driver kit installer from the Emulex Web site to your system. There is one driver kit installer for the full driver kit and one driver kit installer for the core driver kit. Only one driver kit may be installed on any system. The driver kit installer is an executable file with a name similar to storportminiportkit_2.20.006.exe for the full driver kit, or storportminiportcorekit_2.20.006.exe for the core driver kit."

   **Note:** The name of the driver kit installer depends on the current version identifier.

2. Once you download the driver kit installer, you have several options:
   - For an automatic interactive installation without customization, see “Option 1: Automatically Run AutoPilot Installer” on page 6.
   - For control of all interactive installation settings, see “Option 2: Run AutoPilot Installer Separately” on page 6.
   - To create your own AutoPilot Installer kits and deploy them, see “Option 3: Create an AutoPilot Installer Kit” on page 7.
   - For an unattended installation with AutoPilot Installer, see “Performing an Unattended Installation” on page 13.

# Starting Installers from a Command Prompt or Script

When a driver kit installer or AutoPilot Installer is run from a command prompt or command script (batch file), the Windows command processor does not wait for the installer to run to completion. Thus you cannot check the exit code of the installer before the next command is executed. Emulex recommends that command line invocation always use the “start” command with the “/wait” option. This will cause the command processor to wait for the installer to complete before it continues. The preferred method for launching the driver kit Installer from a command prompt or a command script is:

```
start /wait storportminiportkit_2.20.006
```

# Running a Software Installation Interactively

There are three options when performing an installation interactively. These options assume you have already downloaded the driver kit installer from the Emulex web site.

**Option 1: Automatically Run AutoPilot Installer**

Use this option unless you have specific configuration needs. This option allows you to complete a driver kit installation and AutoPilot installation with a few simple mouse clicks.

1. Double-click the driver kit installer or run it from a command line. See “Driver Kit Installer Command Line Parameters” on page 14 for information on the command line options. One command line parameter, APargs, lets you specify arguments that will automatically be passed to the AutoPilot Installer command. A Welcome page is displayed with driver kit version information and Emulex contact information.
2. Click **Next** to proceed to the Installation Options page.

   For each installation option, the default installation location for that option is displayed. Browse to a different location, if desired.

   - For the core driver kit, there is only one installation option: Perform AutoPilot Installation.
   - For the full driver kit, you have an additional option to Create AutoPilot Installer Kits. The default option is Perform AutoPilot Installation only.
3. Click **Install** to continue the installation.

   The Progress dialog box is displayed. After all tasks complete, a Finish page is displayed. The Start AutoPilot Installer box is automatically selected.
4. Click **Finish**. AutoPilot Installer is run automatically.

**Option 2: Run AutoPilot Installer Separately**

This option is recommended to:

- Change installation settings, such as the HBAnyware management mode, for a limited number of systems.
- Familiarize yourself with AutoPilot Installer configuration options.
- Test a configuration file that you created as part of Option 3 (see below).

To access these features, you run AutoPilot Installer after driver kit installation is done. This allows you to change the configuration options supplied to AutoPilot Installer (see below).

1. Perform steps 1 through 3 for Option 1.
2. Clear the **Run AutoPilot Installer** check box on the Finish page.
3. Click **Finish**. The driver kit installer exits.

After the driver kit installation is finished, change the configuration in one of two ways:

- Change the configuration file. See “Software Configuration Parameters” on page 17 for details.
- Supply parameters on the command line. See “Command Line Parameter Settings” on page 16 for details.

Once you have finished this step, you can run AutoPilot Installer at a later time, using either of the following methods: (If you are supplying options via the command line, you must use the second option.)

- Select **Programs>Emulex>AutoPilot Installer** in the Start menu.
- Run AutoPilot Installer from a command line by running

```
"C:\Program Files\Emulex\AutoPilot Installer\APInstall.exe""
```

**Note:** The location of APInstaller.exe may differ on your system, depending on your system's Program Files location. You may also specify a different location when you install the driver package.

**Option 3: Create an AutoPilot Installer Kit**

This option is recommended to install the same customized configuration on multiple systems in your SAN.

1. Run the driver kit installer. The Installation options page is displayed.
2. Select the **Create AutoPilot Installer Kits** option.
3. Clear the **Perform AutoPilot Installation** option unless you also want to run AutoPilot Installer using Option 1 or Option 2 as previously described. The Create AutoPilot Installer Kits option will not install any additional programs on your system. Instead, files will be copied to a Documents folder. The files can be used to create AutoPilot Installer Kits. An AutoPilot Installer Kit is a folder containing APInstall.exe and other files. You run this copy of APInstall.exe from the command line.

After the driver kit installer is finished, you'll typically find APInstall.cfg in:

*Documents*\Emulex\AutoPilot Installer Kit *version*\Installers

where *Documents* is your Documents folder (named “My Documents” in Windows Server 2003 or “*username*\Documents” in Windows Server 2008/Vista) and *version* is the driver package version identifier. You can specify a different AutoPilot Installer kits folder when you select the Create AutoPilot Installer Kits option.

See “Configuring an AutoPilot Installer Kit” on page 15 for more information on creating a custom kit.

## Hardware-First Installation or Driver and Utility Update

The driver kit installer must be downloaded from the Emulex Web site and installed. Either the full or the core package may be installed; only one can be installed on a system.

**Note:** To update the Storport Miniport driver, begin the following procedure at step 2.

To perform a hardware-first installation:

1. Install a new Emulex adapter and power-on the system. If the Windows Found New Hardware wizard is displayed, click **Cancel** to exit. AutoPilot Installer performs this function.

**Note:** If there are multiple adapters in the system, the Windows Found New Hardware wizard appears multiple times. Click **Cancel** to exit the wizard each time it appears.

2. Run AutoPilot Installer using any of the options listed in the “Running a Software Installation Interactively” on page 6.
3. When the AutoPilot Installer Welcome page appears, select an adapter in the list and click **Next**. Installation continues. Specific considerations:
   - If you are replacing a SCSIport Miniport or FC Port driver, an Available Drivers list will be displayed for your review. Click **OK** on this window.
   - If you are updating the driver and the utility, your existing management modes and port settings will be used, unless otherwise specified in the configuration file. These settings will be pre-selected but can be changed. Set or change settings, then click **Next**.
   - If you are **initially** installing a vendor-specific version of the Emulex driver installation program, a Driver Configuration page may be displayed. This page includes one or more windows with questions that you must answer before continuing the installation process. In this case, answer each question and click **Next** on each window to continue.
4. If the Utilities Installation page appears (as seen in Figure 1), select how adapters (local and remote) are managed by the HBAnyware utility.

   **Note:** The display of the Utilities Installation page is optional and based on settings on the AutoPilot Installer command line or in the AutoPilot Configuration file. See “Software Configuration Parameters” on page 17 for more information.

   The following configurations can be selected:

   - Strictly Local Management - The HBAnyware utility only manages the adapters on this host and no remote management of adapters is allowed.
   - Local Management Plus - The HBAnyware utility only manages the adapters on this host. Management of adapters on this host from other hosts is allowed.
   - Full Management - The HBAnyware utility manages the adapters on this host and other hosts that allow it. Management of adapters on this host from other hosts is also allowed.
   - Read Only Management - If you select this check box, the HBAnyware utility cannot perform configuration tasks, such as changing driver parameter values or updating firmware.
     - This option cannot be checked if Strictly Local Management is selected.
     - If Local Management Plus is selected, the HBAnyware utility can view information about the adapters on this host but cannot change the information.
     - If Full Management is selected, the HBAnyware utility can view information about the adapters on this host and other hosts that allow it, but cannot change the information.

     In both cases, other hosts can view and manage the local host’s adapters.

- To prevent the management mode from being changed after installation, clear the **Allow users to change the management mode after installing the utility** check box.

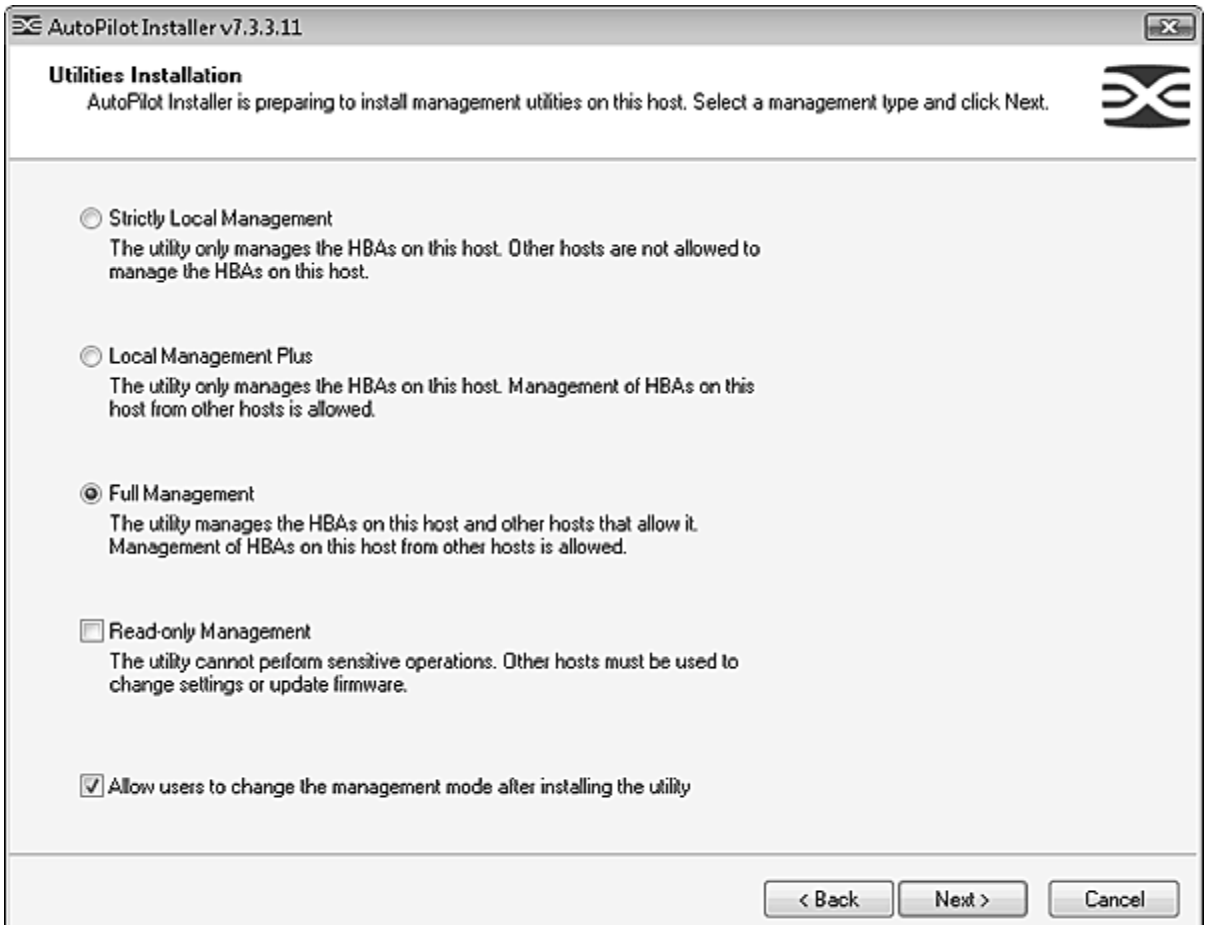
AutoPilot Installer v7.3.3.11
Utilities Installation
AutoPilot Installer is preparing to install management utilities on this host. Select a management type and click Next.
Strictly Local Management
The utility only manages the HBAs on this host. Other hosts are not allowed to manage the HBAs on this host.
Local Management Plus
The utility only manages the HBAs on this host. Management of HBAs on this host from other hosts is allowed.
Full Management
The utility manages the HBAs on this host and other hosts that allow it. Management of HBAs on this host from other hosts is allowed.
Read-only Management
The utility cannot perform sensitive operations. Other hosts must be used to change settings or update firmware.
Allow users to change the management mode after installing the utility
< Back
Next >
Cancel

*Figure 1: Utilities Installation Management Mode Setup*

5. Click **Next**. Installation automatically continues to completion. A dialog box will be displayed if Windows requires a reboot. View the progress of the installation. Once the installation is successful, a Finish page appears.
6. View or print a report, if desired.
   - View Installation Report - The installation report is a text file with current Emulex adapter inventory, configuration information and task results.
   - Print Installation Report - The Windows print dialog is displayed to select options for printing the installation report.
7. Click **Finish** to exit AutoPilot Installer. If your system requires a reboot as indicated in step 5, you must do so before using the drivers or utilities.

## Software-First Installation

The driver kit installer must be downloaded from the Emulex Web site and installed on your system. Either the full or core driver package may be installed; only one can be installed on a system.

To perform a software-first installation:

1. Run AutoPilot Installer using any of the options listed in the “Running a Software Installation Interactively” on page 6. The following message appears:

AutoPilot Installer Warning
AutoPilot Installer cannot find any Emulex Fibre Channel HBAs in this system.
AutoPilot Installer can perform a driver pre-installation, allowing you to install your HB
Click OK to pre-install drivers, or click Cancel to stop the installation.
OK
Cancel

*Figure 2: AutoPilot Installer Warning (Software-First Installation)*

2. Click **OK**. A Welcome page appears.
3. Click **Next**. Installation automatically completes.

   View the progress of the installation. Once the installation is successful, a Finish Page appears.
4. View or print a report, if desired.
   - View Installation Report - The installation report is a text file with current Emulex adapter inventory, configuration information and task results.
   - Print Installation Report - The Windows print dialog is displayed to select options for printing the installation report.
5. Click **Finish** to exit AutoPilot Installer.

## Utility-Only Update

You can reinstall or update a utility without reinstalling the Storport Miniport driver. This option is only available if the Storport Miniport driver in the driver kit installer is the same version as the driver that is already installed on the system.

For unattended installations, the ForceDriverUpdate setting must be set to false. (See “Software Configuration Parameters” on page 17.)

For attended hardware-first utility updates:

1. Run AutoPilot Installer using any of the options listed in the “Running a Software Installation Interactively” on page 6.

2. When the AutoPilot Installer Welcome page appears, click **Next**.The Driver Installation Issue page is displayed.

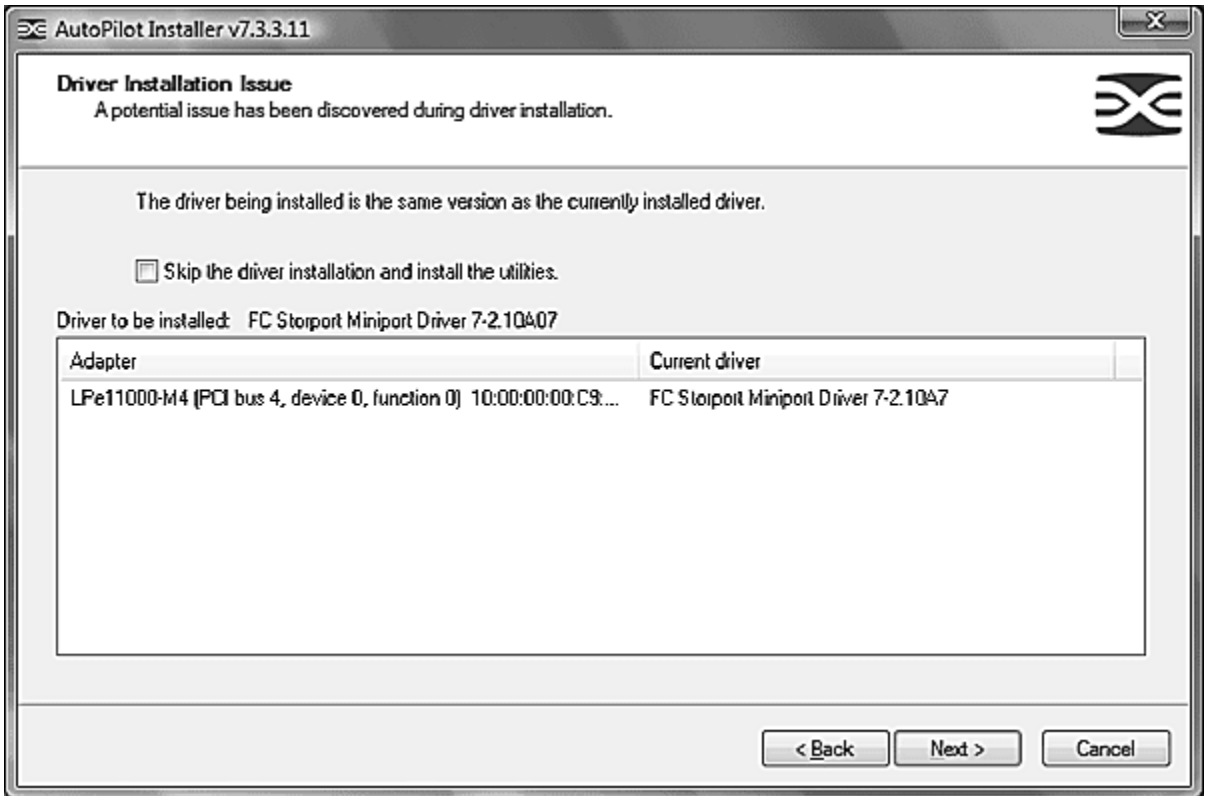
AutoPilot Installer v7.3.3.11
Driver Installation Issue
A potential issue has been discovered during driver installation.
The driver being installed is the same version as the currently installed driver.
Skip the driver installation and install the utilities.
Driver to be installed: FC Storport Miniport Driver 7-2.10A07
Adapter
Current driver
LPe11000-M4 (PCI bus 4, device 0, function 0) 10:00:00:00:C9:...
FC Storport Miniport Driver 7-2.10A7
< Back
Next >
Cancel

*Figure 3: Driver Installation Issue*

3. Select the **Skip the driver installation and install the utilities** check box and click **Next.** To stop installation, click **Cancel**.
4. View or print a report, if desired.
   - View Installation Report. The installation report is a text file with current Emulex adapter inventory, configuration information and task results.
   - Print Installation Report - The Windows print dialog is displayed to select options for printing the installation report.
5. Click **Finish** to exit AutoPilot Installer. If the system needs to reboot, you are prompted to do so after you click **Finish**.

For software-first utility updates:

1. Run AutoPilot Installer. A dialog appears asking if you want to perform a software-first installation of the drivers and utilities, or just an installation of utilities.
2. Select **Utilities Only**. Installation proceeds. View the progress of the utility installation. Once the utility installation is successful, a congratulations window appears.
3. View or print a report, if desired (see details in step 4 of the previous procedure).
4. Click **Finish** to exit AutoPilot Installer.

## Diagnostics

Once the AutoPilot Installer finishes, the Diagnostics window is displayed. Figure 4 shows a successful installation.

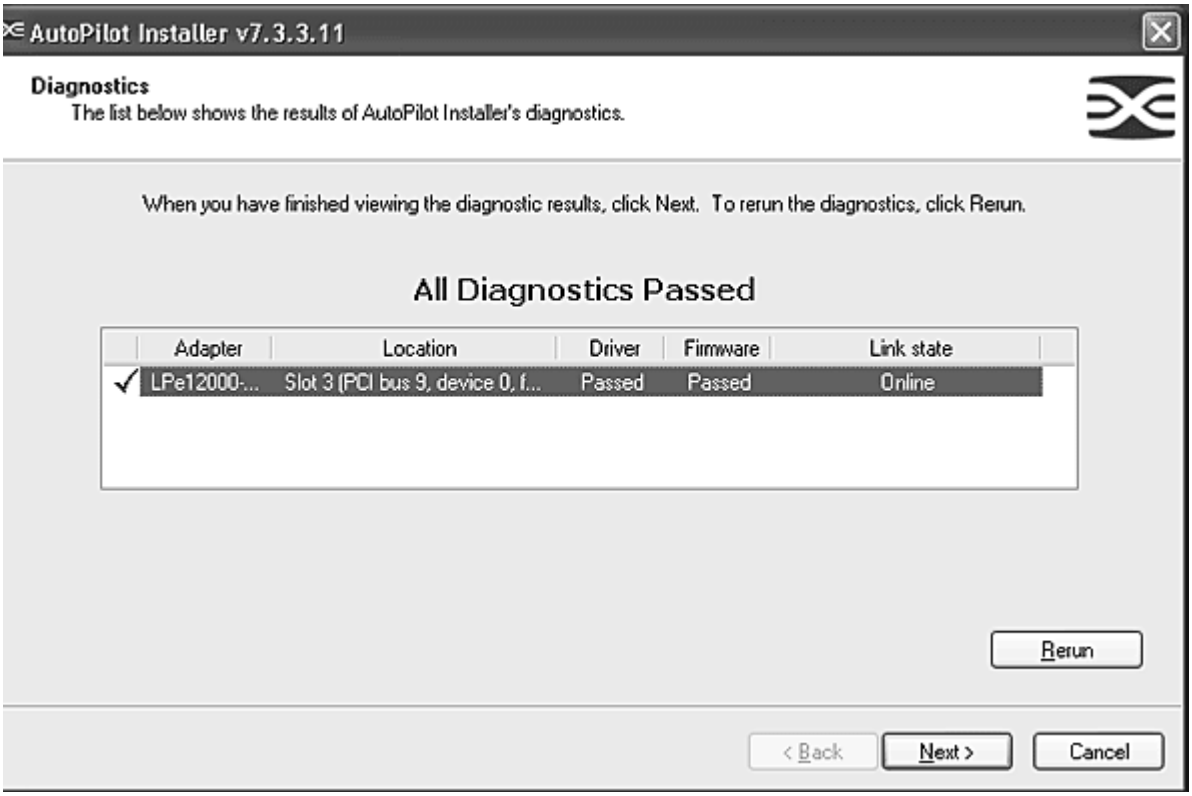


*Figure 4: AutoPilot Installer Diagnostics.*

**Note:** AutoPilot Installer can be run again from the Start menu (Programs>Emulex>AutoPilot Installer) or APInstall.exe can be run from a command prompt.

If the installation fails, the Diagnostics window shows that the adapter failed. If the adapter fails:

1. Select the adapter to view the reason an adapter failed. The reason and suggested corrective action are displayed.
2. Perform the suggested corrective action and run AutoPilot Installer again.

# Performing an Unattended Installation

An unattended installation, sometimes referred to as a quiet or silent installation, requires no user input. This is useful for performing an installation remotely from a command script, or when you want to make sure a custom configuration will not be changed by a user during installation.There are several ways to perform an unattended installation. These correspond to the options for running the software installation interactively.

**Option 1: Automatically Run AutoPilot Installer**

Run the driver kit installer from a command prompt or script. Specify the "/q" (quiet) command line option. For example:

```
storportminiportkit_2.20.06.exe /q
```

**Note:** The name of the driver kit installer depends on whether you are installing the full or core package and the current version identifier. For other command line options, see "Driver Kit Installer Command Line Parameters" on page 14.

**Option 2: Run AutoPilot Installer Separately**

- Run the driver kit installer, but defer running AutoPilot Installer. Then choose one of the following options:
  - Run AutoPilot Installer from a command prompt or script with the silent option:
    `APInstall.exe /silent`
  - Edit the AutoPilot Installer configuration file before running AutoPilot Installer. The configuration file is typically in:
    `C:\Program Files\Emulex\AutoPilot Installer\APInstall.cfg`

    Uncomment the line that sets SilentInstallEnable to "True". There are other settings in the same section of the configuration file related to unattended installations that you may also want to edit. See "Software Configuration Parameters" on page 17 for more information. After editing the file, you can run AutoPilot Installer from the Start menu, a command prompt or a script.

**Option 3: Create an AutoPilot Installer Kit**

- Run the full driver package installer and choose the **Create AutoPilot Installer Kits** option. Then do one of the following:
  - Create AutoPilot Installer kits using the makekit.cmd script (makekit script), as described in the "Configuring an AutoPilot Installer Kit" on page 15. Run APInstall.exe in the kit folder you create, specifying the "/silent" switch.
  - For customized settings, edit the AutoPilot Installer configuration file as previously described, except edit the file
    *Documents*\Emulex\AutoPilot Installer Kit *version*\Installers\APInstall.cfg
    instead of the one in Program Files. Create AutoPilot Installer kits using the makekit script, as described in "Configuring an AutoPilot Installer Kit" on page 15. Run APInstall.exe in the kit folder you create.

See "Starting Installers from a Command Prompt or Script" on page 6 for important information on running the installer from a command prompt or script.

When in unattended installation mode, AutoPilot Installer does the following:

1. Reads the configuration file.
2. Reads any options that may be specified on the command line, overriding the configuration file settings as appropriate.
3. Opens the installation report file.
4. Validates the operating system.
5. Discovers adapters and records the adapter inventory in the report file.
6. Verifies mandatory configuration file parameters.
7. Searches for drivers to be installed based on the LocalDriverLocation setting in the configuration file.
8. If appropriate, verifies that the selected driver is a different type than the currently installed driver, or more recent version of the currently installed driver.
9. Copies the driver parameters from the configuration file into the registry for the driver's coinstaller.
10. Installs/updates the driver.
11. Rediscovers adapters and records the updated adapter inventory in the report file.
12. Records the final results and closes the report file.

# Driver Kit Installer Command Line Parameters

You can pass command line parameters to AutoPilot Installer, yet still have it run automatically by the driver kit, if you run the driver kit installer from a command prompt or script.

If you specify the “/q” switch with the driver installer command, the driver installer will run in unattended mode and it will automatically invoke APInstall.exe with its “/silent” switch. See the “Performing an Unattended Installation” on page 13 for more information.

If you specify a value for the “APargs” driver kit parameter, this value will be appended to the APInstall.exe command line. See “Command Line Parameter Settings” on page 16 for more information on the AutoPilot Installer settings that may be specified in the APargs value.

For example, assume the driver kit file you downloaded from the Emulex web site is named storportportminiportkit_2.20.006.exe. If you execute this installer file as:

```
storportminiportkit_2.20.006.exe /q APargs=ManagementMode=Full
```

then after installing AutoPilot Installer, the driver kit will automatically execute it as:

```
APInstall.exe /silent ManagementMode=Full
```

To specify more than one AutoPilot Installer parameter, separate the settings by one or more spaces and put quotes around the entire APargs expression. For example, the command line (all on one line)

```
storportminiportkit_2.20.006.exe "APargs=ManagementMode=ReadOnly
ManagementModeChangeable=FALSE"
```

results in AutoPilot Installer being run as:

```
APInstall.exe ManagementMode=ReadOnly ManagementModeChangeable=FALSE
```

AutoPilot Installer parameter values that contain spaces, such as path names, must be enclosed in quotes. To add such a setting to APargs, you must insert backslashes before the quotes around the value, and then add quotes around the entire APargs expression. For example, the command line (all on one line)

```
storportminiportkit_2.20.006.exe "APargs=ReportLocation=\"C:\Documents and
Settings\Administrator\My Documents\reports\""
```

results in AutoPilot Installer being run as:

```
APInstall.exe ReportLocation="C:\Documents and Settings\Administrator\My
Documents\reports"
```

If you have many parameters to pass to AutoPilot Installer, or if you want to do so repeatedly, then it may be less error prone to run the driver kit installer interactively, delay AutoPilot Installer execution, and then run the AutoPilot Installer command yourself. The procedure for doing so is described in the “Option 2: Run AutoPilot Installer Separately” on page 6 and “Performing an Unattended Installation” on page 13.

# Configuring an AutoPilot Installer Kit

To configure an AutoPilot Installer kit:

1. Create an AutoPilot Installer Kits folder by using the Create AutoPilot Installer Kits option of the full driver kit. See “Option 3: Create an AutoPilot Installer Kit” on page 13. By default, the driver kit will create a folder named
   *Documents*\Emulex\AutoPilot Installer Kit *version*\Installers

   where *Documents* is your Documents folder (named “My Documents” in Windows Server 2003) and *version* is the driver package version identifier. However, you may specify a different location for the folder.
2. Open a command prompt window and cd to the folder created by the driver kit.
3. If desired, customize the APInstall.cfg file. It is located in the Installers folder within the folder created by the driver kit. See “AutoPilot Configuration File” on page 20 for more information.
4. Decide whether you want AutoPilot Installer to install the full utilities kit (including the HBAnyware GUI and CLI) or just the core utilities kit (no GUI).

   **Note:** The GUI cannot be installed on Server Core systems.
5. Decide which CPU architectures on which you'll install the kits: x86, x64, or IA64.
6. Run the makekit command script in the folder created by the driver kit:

   ```
   makekit
   ```

   The makekit script will prompt you for the CPU architecture and utilities set.

If you prefer, you may run makekit non-interactively, from a command prompt or a command script. To see all the `makekit` options, type:

```
makekit ?
```

For example, to create a kit folder for x86 machines that installs the full utility set, you can type:

```
makekit x86 full
```

Unless you specify a different path on the makekit command, makekit will create a folder in the current folder by concatenating the architecture and utilities options chosen. For example:

```
x86_full_kit
```

**Note:** Since makekit is a command script, you must precede it with the Windows **call** command to call it from another command script. Otherwise, the parent script will not continue after the makekit script exits. For example:

```
REM Create kit for Windows Server 2008 x64 Core installations.
call makekit x64 core \\server\share\Emulex_x64_core_kit
if errorlevel 1 echo Creation of Emulex_x64_core_kit failed
```

## AutoPilot Installer Command Line Parameters

The syntax used to run AutoPilot Installer silently from a command line or script is:

`APInstall [/silent] [parameter setting][parameter setting...]`

The “silent” switch and parameter settings can occur in any order. One or more spaces must separate the switch and each parameter setting.

### Command Line Parameter Settings

The syntax of a parameter setting is

`parameter_name =["]value["]`

Double quotes are required only around values that contain spaces. Spaces may separate parameters, equal signs and values. Parameter names and values are not case-sensitive.

The APInstall command may contain the settings listed below. Each setting, except ConfigFileLocation, may also be specified in the AutoPilot Configuration file. For descriptions of each parameter, see “Software Configuration Parameters” on page 17.

Settings specified in the APInstall command override those specified in the configuration file.

```
ConfigFileLocation = path-specifier
NoSoftwareFirstInstalls = { TRUE | FALSE }
SilentRebootEnable = { TRUE | FALSE }
ForceDriverUpdate = { TRUE | FALSE }
ForceDriverTypeChange = { TRUE | FALSE }
SkipUtilityInstall = { TRUE | FALSE }
SkipDriverInstall = { TRUE | FALSE }
InstallWithoutQFE = { TRUE | FALSE }
ForceRegUpdate = { TRUE | FALSE }
LocalDriverLocation = path-specifier
UtilitiesLocation = path-specifier
ReportLocation = path-specifier
ManagementMode = { LocalOnly | LocalPlus | LocalReadOnlyPlus | ReadOnly | Full }
HideManagementModeGUI = { TRUE | FALSE }
ManagementModeChangeable = { TRUE | FALSE }
```

#### Path Specifiers

Paths may be specified as

- an explicit path:

  `ReportLocation="C:\Program Files\Emulex\AutoPilot Installer\Reports"`

  **Note:** The double quotes are required for values that contain spaces, such as the value above.

- a relative path:

  `LocalDriverLocation="Drivers\Storport Miniport\"`

  (assuming installation into “C:\Program Files\Emulex\AutoPilot Installer\”, this path would logically become “C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport Miniport\”)

- with the %ProgramFiles% environment variable:

```
UtilitiesLocation = "%ProgramFiles%\Emulex\AutoPilot Installer\Utilities"
```

## Configuration File Location

The optional setting ConfigFileLocation contains the path to the configuration file that should be used. If this parameter is not specified, AutoPilot Installer will use the file named APInstall.cfg in the same folder as APInstall.exe.

The format is the same as that of the other path settings.

**Example**

```
APInstall /silent SkipDriverInstall=True ManagementModeChangeable="True"
configFileLocation=MyConfiguration.cfg
```

## Software Configuration Parameters

### DiagEnable (Running Diagnostics)

**Note:** The DiagEnable parameter cannot be specified on the command line.

Default: True

By default, AutoPilot Installer will run its diagnostics after all driver installation tasks have been completed. To disable this function, set this parameter to false.

### ForceDriverTypeChange (Forcing a Driver Type Change)

Default: False

When installing a driver, set this parameter to true to cause silent mode installations to update/install the Storport Miniport driver on each adapter in the system, without regard for the currently installed driver type (replacing any installation of the SCSIport Miniport or FC Port driver).

### ForceDriverUpdate (Forcing a Driver Version Update)

Default: False

By default, if the same version of the driver is already installed, an unattended installation will proceed with installing only the utilities.To force a driver update even if the same version of the driver is installed, set this parameter to true.

**Note:** ForceDriverUpdate applies to unattended installations only; in interactive installations this parameter is ignored. Instead you are asked if the driver should be updated.

### ForceRegUpdate (Forcing Updates of an Existing Driver Parameter Value)

Default: False

The ForceRegUpdate driver parameter setting determines if existing driver parameters are retained or changed when you update the driver. By default, all existing driver parameter settings are retained. The ForceRegUpdate parameter does not affect any existing persistent bindings. To set up an installation to remove the existing driver parameters from the registry and replace them with parameters specified in the AutoPilot Configuration file, set this parameter to true.

**Note:** You can also use this setting for attended installations with the AutoPilot Installer wizard if you modify the AutoPilot Configuration file in an AutoPilot Installer Kit.

### SkipUtilityInstall (Installing Driver Without Utilities)

Default: False

You can set up an unattended installation to install the driver without installing the utilities package. By default, the utilities are automatically installed with an unattended installation. To set up an installation without utilities, set this parameter to true.

### LocalDriverLocation (Specifying Location to Search for Drivers)

Default: Drivers (The default “Drivers” folder is located in the same folder as AutoPilot Installer.)

You can specify a local location that is to be searched for drivers during unattended installations. The location may be a local hard drive or a network share. Removable media are not searched. Example: `localDriverLocation = "d:\drivers\new\Storport"`

**Note:** On x64 and 32-bit systems, the path specified by 'LocalDriverLocation' must contain at least one instance of both an ElxCna (for CNAs) and ElxStor (for HBAs and CNAs) driver. AutoPilot Installer will automatically select the most recent revisions that it finds.

For IA64 systems, only ElxStor drivers are supported.

### NoSoftwareFirstInstalls (Prohibiting Software First Installations)

Default: False

When this parameter is set to true, AutoPilot Installer prevents unattended installations from performing software-first installations. This way, you can execute an automated installation on multiple machines in your network, but only machines with Emulex adapters will actually have Emulex drivers updated or installed.

### ManagementMode (Managing Emulex Adapters)

Default: LocalPlus

This parameter controls how the HBAnyware utility manages local and remote adapters. The ManagementMode parameter works with the ManagementModeChangable and HideManagementModeGUI parameters.

- LocalOnly - The utility only manages the adapter on this host and no remote management of adapters is allowed.
- LocalPlus - The utility only manages the adapters on this host. Management of adapters on this host from other hosts is allowed.
- Full - The utility manages the adapters on this host and other hosts that allow it. Management of adapters on this host from other hosts is also allowed.
- LocalReadOnlyPlus - The utility has read-only access to the adapters on this host. Remote hosts must be used to fully manage the adapters on this host.
- ReadOnlyPlus -The utility has read-only access to the adapters on this host and other hosts that allow it. Remote hosts must be used to fully the manage adapters on this host.

To set this parameter, set the parameter value to one of the names listed above.

Example: `ManagementMode = "LocalOnly"`

**Note:** If this setting is not specified and a utility upgrade is being performed, the existing value of this setting will be retained.

### ManagementModeChangable (Changing Management Mode)

Default: True

By default, you can change the management mode after the HBAnyware utility is installed, by selecting the **Management Mode** parameter in the HBAnyware utility's File menu. If the ManagementMode parameter is disabled and the ManagementModeChangable parameter is set to false, you must reinstall the HBAnyware utility to change the management mode.

**Note:** If this setting is not specified in the configuration file and a utility upgrade is being performed, the existing value of this setting will be retained.

### HideManagementModeGUI (Hiding the Management Mode Configuration)

Default: True

The Utilities Installation page can be displayed by Autopilot Installer. (See Figure 1 on page 9.) The page is displayed only if this parameter is set to false. AutoPilot Installer then reads the configuration file parameters and uses those settings to pre-select the appropriate options in the page.

If this parameter is omitted from the configuration file or explicitly set to true, the page is not displayed. AutoPilot Installer will use configuration file parameters to determine the appropriate management mode.

### ManagementPort (Specifying the Port Number)

**Note:** The ManagementPort parameter cannot be specified on the command line.

Default: 23333 (assigned to Emulex by the Internet Assigned Numbers Authority [IANA])

A numeric value indicating the port number at which Emulex utilities should operate. If changed, this setting must be propagated throughout any other machines on the SAN.

### ReportLocation (Setting Up an Installation Report Title and Location)

The automatically generated file name for reports is

"`report_`*`mm-dd-yy`*`.txt`"

where *'mm'* is the month *number*, *'dd'* is the day, and *'yy'* indicates the year.

You can only change the installation report folder; the file name is auto-generated. In the following example *x* could be any available drive:

```
ReportLocation = "x:\autopilot\reports\installs\"
```

### SilentInstallEnable (Enabling Unattended Installation)

**Note:** Setting the SilentInstallEnable parameter to true in the configuration file is functionally equivalent to supplying the "/silent" switch on the command-line. You cannot specify the SilentInstallEnable parameter on the command line.

Default: False

Setting this parameter to true causes AutoPilot Installer to operate with no user interaction.

### SilentRebootEnable (Enabling Silent Reboot)

Default: False

If Windows must be restarted after a driver is installed, AutoPilot Installer's default behavior in unattended installations is not to restart the system. AutoPilot Installer continues with the installation and you must restart at a later time. Restarts often require you to login as part of the Windows start up process and without logging in, the installation process would hang if it restarted the system. However, Windows can be configured to start up without requiring you to login. You must make sure it is safe to restart the system during unattended installations if you are going to set this parameter to true.

### InstallWithoutQFE (Enabling Installation if a QFE Check Fails)

Default: False

AutoPilot Installer checks for Microsoft's Quick Fix Engineering updates (QFEs), also known as KB (Knowledge Base) updates, based upon the checks you have specified in the [STORPORT.QFES] section. By default, the installation will terminate if the QFE check should fail. To enable a driver installation to proceed even if a check for QFEs should fail, set this parameter to true.

## AutoPilot Configuration File

The AutoPilot Configuration file is organized into sections, grouped according to related commands. There are six main sections. Each section begins with a heading. The heading is required even if there are no settings in the section. The only section not required is the Installation Prompts section, which has the heading [STORPORT.CONFIGURATION]. That section cannot exist if AutoPilot Installer will be run in silent mode. You must delete or comment-out that entire section for unattended installation. The sections and their headings are:

- Configuration Identification [AUTOPILOT.ID] - This section appears at the beginning of every AutoPilot Configuration file. This section contains revision and label information. The revision entry identifies the file's version number and the date on which it was produced. The label entry is used to identify the configuration that the file supports. This section can appear only once in the AutoPilot Configuration file.
- Software Configuration [AUTOPILOT.CONFIG] -This section can contain settings that control and configure AutoPilot Installer and the HBAnyware utility operation. This section can appear only once in the AutoPilot Configuration file.
- Installation Prompts [STORPORT.CONFIGURATION] - This section can contain questions that must be answered during the initial installation process. This section applies to attended installations only, this section must not be present in configuration files to be used with unattended installations.
- Driver Parameters [STORPORT.PARAMS] - This section can specify driver parameters. Parameters are read exactly as they are entered and are written to the registry.
- System Parameters [SYSTEM.PARAMS] - This section can adjust the operating system's global disk timeout. The timeout is stored in the registry under the key HKML\CurrentControlSet\Services\disk and specified with the following string: TimeOutValue = 0x3C (where the number is the timeout value in seconds.)
- Additional Quick Fix Engineering (QFE) Checks [STORPORT.QFES] - This section can specify additional QFE check, also known as KB (Knowledge Base) updates, during installation. This section can appear anywhere within the file as long as it is not contained within another section.

Lines that begin with a semicolon are comments. Some of the comments are sample settings. To use the setting, remove the semicolon.

### Using the Windows Environment Variable (%ProgramFiles%)

You can use the Windows ProgramFiles environment variable in the LocalDriverLocation, UtilitiesLocation and ReportLocation strings within the configuration file. This allows you to specify strings in a driver independent manner, allowing the same configuration file to be used on different systems where Windows may have been installed on different drives. To use this option, "%ProgramFiles%" must be the first component specified in the string. The portion of the string that follows will be appended to the contents of the ProgramFiles environment variable.

**Note:** The contents of the ProgramFiles environment variable is not terminated with a slash, so one must be provided in the string. Windows environment variables are not case-sensitive.

```
UtilitiesLocation = "%ProgramFiles%\my company\our utilities"
```

## Configuration Identification [AUTOPILOT.ID]

This section contains revision and label information. The revision entry identifies the file's version number and the date on which it was produced. The label entry is used to identify the configuration that the file supports. This section may appear only once in the APInstall.cfg file.

## Software Configuration [AUTOPILOT.CONFIG]

The settings in this section affect the operation of AutoPilot Installer during installation. They also affect the operation of the HBAnyware utilities after they are installed. See "Software Configuration Parameters" on page 17 for information about settings that may be specified in this section.

## Configuration Prompts/Vendor-Specific Questions [STORPORT.CONFIGURATION]

**Note:** You must remove or comment out the entire [STORPORT.CONFIGURATION] section for an unattended installation.

A [STORPORT.CONFIGURATION] section may exist in the AutoPilot Configuration file.The first items in this section are the driver parameters to be used regardless of how the questions are answered. This is followed by a subsection that contains questions (these may be vendor-specific questions). A line containing '[QUESTIONS]' marks the start of the subsection, and the end of it is marked by a line containing '[ENDQUESTIONS]'. Within the question subsection there can be as many questions as needed. Each question uses the format:

```
question= "question?", "explanation", "answer0", "answer1", "answer2",.... ,
"answern"
Where:
```

"*question?*" contains the text of the question to be asked.

*"explanation"* contains brief text to help explain the question. The explanation will appear below the question in a smaller font. If there is no explanatory text, empty quotes must be used in its place.

"*answer0*" contains the 1st answer to be displayed in the drop down list.

"*answer1"* contains the 2nd answer to be displayed in the drop down list.

"*answern"* contains the *n*th answer to be displayed in the drop down list.

For each question there can be as many answers as needed. For each answer there must be a corresponding "answer =" section with its corresponding driver parameters listed beneath it. The answer uses the format:

```
answer = 0
   DriverParameter="Param1=value; Param2=value;"
answer = 1
   DriverParameter="Param1=value; Param2=value;"
....
answer = n
   DriverParameter="Param1=value; Param2=value;"
```

Example of [STORPORT.CONFIGURATION] section:

```
[STORPORT.CONFIGURATION]

   ;The first section contains the driver parameters common to all
configurations, no matter what answers are given.
   DriverParameter="EmulexOption=0;"

   [QUESTIONS]
      question = "What is your link speed?", "Note: select 'Auto-detect' if you
are unsure about the answer.", "4GB", "2GB", "1GB", "Auto-detect"
           ANSWER = 0
                DriverParameter = "LinkSpeed=4;"  ;4 GB
           ANSWER = 1
                DriverParameter = "LinkSpeed=2;"  ;2 GB
           ANSWER = 2
                DriverParameter = "LinkSpeed=1;"  ;1 GB
           ANSWER = 3
                DriverParameter = "LinkSpeed=0;"  ;Auto-detect
      question = "Describe the topology of your storage network.", "Note:
Select 'Arbitrated Loop' when directly connected to the array (no fibre
switch). Select 'Point-to-Point' when connected to a SAN (fibre switch).",
"Arbitrated Loop", "Point-to-Point"
           ANSWER = 0
                DriverParameter = "Topology=2;"
           ANSWER = 1
                DriverParameter = "Topology=3;"
   [ENDQUESTIONS]
[END.STORPORT.CONFIGURATION]
```

## QFE Checks [STORPORT.QFES]

To add a Windows Quick-Fix Engineering (QFE) check to the configuration file, edit the [STORPORT.QFES] section in the AutoPilot Configuration file. You may place this section anywhere within the file as long as it is not contained within another section. This section contains a single line for each QFE that is to be checked. Up to 10 lines will be checked, more than that may exist but they will be ignored. All parameters in each line must be specified. These lines have the format

```
qfe = "qfe name", "path and file name", "file version", "applicable OS"
```

qfe name - The name of the item being checked. For example, QFE 838896. The name should facilitate searching Microsoft's Web site for any required code updates.

path and file name - This string identifies the file to be checked and its location relative to the Windows home folder. In most cases, the file to check will be the Microsoft Storport driver, for example, “\system32\drivers\storport.sys”. This string is also used in dialogs and log file messages.

file version - This is the minimum version that the file to be checked must have for the QFE to be considered installed. It is specified as a text string using the same format as is used when displaying the files property sheet. For example, “5.2.1390.176”.

applicable OS - This is used to determine if the QFE applies to the operating system platform present. The acceptable values are “Win2003”, “Win2008” and “WinVista”.

Example

```
[STORPORT.QFES]
qfe = "QFE 83896", "\system32\drivers\storport.sys", "5.2.1390.176","Win2003"
```

## Setting Up Driver Parameters [STORPORT.PARAMS]

To change driver parameters, modify this section of the AutoPilot Configuration file. Locate the [STORPORT.PARAMS] section in the AutoPilot Configuration file. This section follows Optional Configuration File Changes. Under the [STORPORT.PARAMS] heading, list the driver parameters and new values for the driver to use.

For example:

```
Driver Parameter = "LinkTimeout = 45"
```

See the HBAnyware Utility User Manual for a listing of driver parameters, defaults and valid values.

## Setting Up System Parameters [SYSTEM.PARAMS]

To change the system parameters, create a [SYSTEM.PARAMS] section in the APInstall.cfg file. Create this section in the Optional Configuration File Changes heading in the [AUTOPILOT.CONFIG] section of the AutoPilot Configuration file.

## AutoPilot Installer Exit Codes

AutoPilot Installer sets an exit code to indicate whether an installation was successful or an error occurred. These exit codes allow AutoPilot Installer to be used in scripts with error handling. In unattended installations, AutoPilot Installer sets the following exit codes:

**Table 3: Unattended Installation Error Codes**

| Error Code | Hex | Description |
|---|---|---|
| 0 | 0x00000000 | No errors |
| 2399141889 | 0x8F000001 | Unsupported operating system detected. |
| 2399141890 | 0x8F000002 | The AutoPilot Configuration file is not found. |
| 2399141891 | 0x8F000003 | Disabled adapters detected in the system. |
| 2399141892 | 0x8F000004 | The selected driver is 64-bit and this system is 32-bit. |
| 2399141893 | 0x8F000005 | The selected driver is 32-bit and this system is 64-bit. |
| 2399141894 | 0x8F000006 | Installation activity is pending. AutoPilot Installer cannot run until it is resolved. |
| 2399141895 | 0x8F000007 | (GUI Mode only) User cancelled execution because user did not wish to perform a software-first install. |
| 2399141896 | 0x8F000008 | No drivers found. |
| 2399141897 | 0x8F000009 | One or more adapters failed diagnostics. |
| 2399141904 | 0x8F000010 | (GUI Mode only) User chose to install drivers even though a recommended QFE or Service Pack was not installed. |
| 2399141920 | 0x8F000020 | (GUI Mode only) User chose to stop installation because a recommended QFE or Service Pack was not installed. |
| 2399141899 | 0x8F00000B | Unattended installation did not find any drivers of the type specified in the config file. |
| 2399141900 | 0x8F00000C | A silent reboot was attempted, but according to the operating system a reboot is not possible. |
| 2399141901 | 0x8F00000D | (GUI Mode only) A driver package download was cancelled. |
| 2399141902 | 0x8F00000E (Non-Enterpri se) | No adapters were found in the system. |
| 2399141903 | 0x8F00000F | A required QFE or Service Pack was not detected on the system. |
| 2399141836 | 0x8F000030 | AutoPilot Installer was not invoked from an account with Administrator-level privileges. |
| 2391419952 | 0x8F000040 | AutoPilot Installer has detected unsupported adapters on the system. |
| 2399141968 | 0x8F000050 | Unattended software-first installations are disallowed. |
| 2399141984 | 0x8F000060 | User cancelled APInstall before any driver/utility installation occurred. |
| 2399142000 | 0x8F000070 | User cancelled APInstall after driver/utility installation occurred. |
| 2399142016 | 0x8F000080 | An attempt to install a full apps kit on a Server Core system was detected. |
| 2399142032 | 0x8F000090 | APInstaller encountered an error while parsing the command line (Report file contains details). |
| 2399142048 | 0x8F0000A0 | Converged Network Adapters (CNAs) are installed, but are not supported on IA64 systems. |

## AutoPilot Installer Installation Reports

During each installation, AutoPilot Installer produces a report describing events that occurred during the installation. This report has several sections.

The first section provides basic information including the time and date of the installation, the name of the machine that the installation was performed on, the version number of AutoPilot Installer, and the identification of the configuration file that was used.

The second section provides an inventory of the Emulex adapters as they were before AutoPilot Installer performed any actions.

The third section lists the tasks that AutoPilot will perform in the order they will be done.

The fourth section records the results of each task. When all driver installation tasks are completed, an updated adapter inventory is recorded.

**Note:** If you cancel AutoPilot Installer, that information is recorded along with when you cancelled the installation. The contents of any error dialogs that are displayed are also recorded.

## Command Script Example

Modifying the configuration file enables you to script the installation of a system's driver. The following example command script (batch file) assumes that you have made mandatory changes to the AutoPilot Configuration file, as well as any desired optional changes.

If your systems were set up with a service that supports remote execution, then you can create a command script to remotely update drivers for all of the systems on the storage net. If Microsoft's RCMD service was installed, for example, a script similar to the following would run remote execution:

```
rcmd \\server1 g:\autopilot\x86_full_kit\apinstall
if errorlevel 1 goto server1ok
echo AutoPilot reported an error upgrading Server 1.
if not errorlevel 2147483650 goto unsupported
  echo Configuration file missing.
goto server1ok
 :unsupported
if not errorlevel 2147483649 goto older
echo Unsupported operating system detected.
 :older
if not errorlevel 2001 goto none
   echo The driver found is the same or older than the existing driver.
   goto server1ok
:none
if not errorlevel 1248 goto noreport
   echo No Emulex adapter found.
goto server1ok
:noreport
 if not errorlevel 110 goto nocfg
   echo Could not open installation report file.
 goto server1ok
:nocfg
 if not errorlevel 87 goto badcfg
```

```
   echo Invalid configuration file parameters.
   goto server1ok
:badcfg
   if not errorlevel 2 goto server1ok
   echo No appropriate driver found.
server1ok
rcmd \\server2 g:\autopilot\ApInstall
ConfigFileLocation=g:\autopilot\mysetup\apinstall.cfg
if errorlevel 1 goto server2ok
echo AutoPilot reported an error upgrading Server 2.
if not errorlevel 2147483650 goto unsupported
   echo Configuration file missing.
goto server2ok
 :unsupported
 if not errorlevel 2147483649 goto older
   echo Unsupported operating system detected.
 :older2
 if not errorlevel 2001 goto none2
   echo The driver found is the same or older than the existing driver.
   goto server2ok
:none2
 if not errorlevel 1248 goto noreport2
   echo No adapter found.
goto server2ok
:noreport
 if not errorlevel 110 goto nocfg2
   echo Could not open installation report file.
 goto server2ok
:nocfg2
 if not errorlevel 87 goto badcfg2
   echo Invalid configuration file parameters.
   goto server2ok
:badcfg2
   if not errorlevel 2 goto server2ok
   echo No appropriate driver found.
server2ok
```

# Manual Installation and Updating Procedures

## Manually Installing or Updating the Storport Miniport Driver

### Overview

You can install or update the Storport Miniport driver and utilities manually without using AutoPilot Installer.

The Emulex PLUS (ElxPlus) driver supports the HBAnyware utility, persistent binding and LUN mapping and masking. The ElxPlus driver must be installed before you install the Storport Miniport driver.

### Removing the Adjunct Driver Registry Key

The ElxPlus driver replaces the adjunct driver that was used with Storport Miniport 1.11a3 or earlier. If currently installed, the adjunct driver registry key must be removed using the deladjct.reg file before you install the ElxPlus driver. The deladjct.reg file was extracted when you installed the old driver.

## Manually Installing the Emulex PLUS (ElxPlus) Driver for the First Time

To install the ElxPlus driver from the desktop:

**Note:** Only one instance of the Emulex PLUS driver should be installed, even if you have multiple adapter ports installed in your system.

1. Run the driver kit installer, but do not run AutoPilot Installer. See “Running a Software Installation Interactively” on page 6 for instructions on how to do this.
2. Select **Start>Control Panel>Add Hardware**. The Add Hardware Wizard window appears. Click **Next**.
3. Select **Yes, I have already connected the hardware** and click **Next**.
4. Select, **Add a new hardware device** and click **Next**.
5. Select **Install the hardware that I manually select from a list (Advanced)** and click **Next**.
6. Select **Show All Devices** and click **Next**.
7. Click **Have Disk....** Direct the Device Wizard to the location of elxplus.inf. If you have installed the driver installer kit in the default folder and C:\ is your Windows system drive, the path is:
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86\HBA for the 32-bit driver version

   or

   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64\HBA for the x64 driver version

   or

   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64\HBA for the Itanium driver version
8. Click **OK**.
9. Select **Emulex PLUS**. Click **Next** and click **Next** again to install the driver.
10. Click **Finish**. The initial ElxPlus driver installation is complete. Continue with manual installation of the Storport Miniport Driver. See page 28 for this procedure.

## Manually Updating the Emulex PLUS (ElxPlus) Driver

To update an existing ElxPlus driver from the desktop:

**Note:** Only one instance of the Emulex PLUS driver should be installed, even if you have multiple adapter ports installed in your system.

1. Run the driver kit installer, but do not run AutoPilot Installer. See “Running a Software Installation Interactively” on page 6 for instructions on how to do this.
2. Select **Start>Administrative Tools>Computer Management.**
3. Click **Device Manager** (left pane).
4. Click the plus sign (+) next to the Emulex PLUS class (right pane) to show the ElxPlus driver entry.
5. Right-click the ElxPlus driver entry and select **Update Driver...** from the menu.
6. Select **No, not this time**. Click **Next** on the **Welcome to the Hardware Update Wizard** window. Click **Next**.
7. Select **Install from a list or specific location (Advanced)** and click **Next**.
8. Select **Don’t Search. I will choose the driver to install**.
9. Click **Have Disk....** Direct the Device Wizard to the location of driver’s distribution kit. If you have installed the driver installer kit in the default folder, the path is:
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86 for the 32-bit driver version

   or
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64 for the x64 driver version

   or
   - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64 for the Itanium driver version
10. Click **OK**. Select **Emulex PLUS**.
11. Click **Next** to install the driver.
12. Click **Finish**. The ElxPlus driver update is complete. Continue with manual installation of the Storport Miniport Driver.

## Manually Installing or Updating the Fibre Channel Storport Miniport Driver

To update or install the Storport Miniport driver from the desktop:

1. Select **Start>Control Panel>System**.
2. Select the **Hardware** tab.
3. Click **Device Manager**.
4. Open the “SCSI and RAID Controllers” item.
5. Double-click the desired Emulex adapter.

   **Note:** The driver will affect only the selected adapter. If there are other adapters in the system, you must repeat this process for each adapter. All DC adapter models will be displayed in Device Manager as two adapters, therefore each adapter must be updated.
6. Select the **Driver** tab.
7. Click **Update Driver.** The Update Driver wizard starts.
8. Select **No, not this time**. Click **Next** on the **Welcome to the Hardware Update Wizard** window.

9. Select **Install from a list or specific location (Advanced)** and click **Next**.
10. Select **Don't search. I will choose the driver to install** and click **Next**.

**Note:** Using the OEMSETUP.INF file to update Emulex's Storport Miniport driver overwrites customized driver settings. If you are upgrading from a previous installation, write down the settings. Following installation, use the HBAnyware utility to restore the pre-upgrade settings.

11. Click **Have Disk....** Direct the Device Wizard to the location of oemsetup.inf. If you have installed the driver installer kit to the default folder, the path is:
    - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86\HBA for the 32-bit driver version

    or

    - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64\HBA for the x64 driver version

    or

    - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64\HBA for the Itanium driver version
12. Click **OK**. Select **Emulex LightPulse LPX000, PCI Slot X, Storport Miniport Driver** (your adapter model will be displayed here).
13. Click **Next**.
14. Click **Finish**.

The driver installation is complete. The driver should start automatically. If the adapter is connected to a SAN or data storage device, a blinking yellow light on the back of the HBA will indicate a link up condition.

## Manually Installing the Driver Utilities

Run the full driver kit installer. Select the **Create AutoPilot Installer Kit** option, clear the **Perform AutoPilot Installation** option and click **Next**. After the files have been copied to your system, the Finish page will show where the files have been placed. Click **Finish**. A Utilities folder will exist in the folder created by the installer.

To install the full utility set (including the HBAnyware utility GUI):

1. Run SetupCommon.exe
2. Run Setup.exe.

**Caution:** Run Setup.exe only after running SetupCommon.exe.

3. Follow the instructions on the setup windows.
4. Click **Finish** in the Finish page to exit setup. The utility installation has completed. The HBAnyware utility automatically starts running.

To install the core utility set:

1. cd to the Core folder in the Utilities folder.
2. Run setupCLI.exe.
3. Click **Finish** in the Finish page to exit setup. The core installation has completed.

# HBAnyware Security Configurator

## Installing the HBAnyware Security Configurator

After the HBAnyware utility and remote server are installed on a group of systems, the utility can remotely access and manage the Emulex adapters on any systems in the group. This may not be desirable because any system with remote access can perform actions such as resetting boards or downloading firmware. The HBAnyware Security Configurator controls which HBAnyware systems can remotely access and manage adapters on other systems in a Storage Area Network (SAN). HBAnyware security is system-based, not user-based. As a result, anyone who can access a system with HBAnyware client access to remote adapters can manage those adapters.

The Emulex driver and the HBAnyware utilities must be installed before you can install the HBAnyware Security Configurator.

To install the HBAnyware Security Configurator:

1. Locate the SSCsetup.exe file. The default path for this file is:

   `C:\Program Files\Util\HBAnyware`

2. Double-click the SSCsetup.exe file. A welcome page appears.
3. Click **Next**. The Setup Status window is displayed. After setup completes, the Emulex HBAnyware Security Setup Completed window appears.
4. Click **Finish**.

# HBAnyware Utility Web Launch Procedures

## Installing the HBAnyware Utility Web Launch Feature

In addition to the driver and HBAnyware utilities, the following software must be installed before you can install the Web Launch feature:

- Microsoft Internet Information Services (IIS) Server. See the Microsoft Web site for information on downloads and installation.
- Java Runtime Environment (JRE). See the http://java.com Web site for information on downloads and installation.

To install the HBAnyware Utility Web launch feature:

1. Click **Programs>Emulex >HBAnyware WebLaunch Install.** Web Launch installation begins.
2. Type the URL address that you want HBAnyware Web Launch to use.

HBAnyware WebLaunch Update URL
EMULEX HBANYWARE WEBLAUNCH JNLP UPDATE
Emulex HBAnyware WebLaunch has found the following IP address: 138.239.87.66
Do you want to configure this IP address for HBAnyware WebLaunch?
Type y [yes] to use this IP address, or
Type n [no] to provide your own IP address, or
Type q to quit configuring IP address.
User input:

*HBAnyware Web Launch, Update URL screen*

## Updating the HBAnyware Utility Web Launch URL

The driver, HBAnyware utilities and HBAnyware Web Launch must be installed before you can update the URL.

To change the IP address for HBAnyware Web Launch:

1. Copy Web Launch-related files to a sub-folder called WebLaunch in the HBAnyware installation folder.
2. Click on **Programs>Emulex>HBAnyware WebLaunch Update URL**.

# Uninstallation

## Uninstalling HBAnyware Web Launch

To uninstall HBAnyware Web Launch, but leave the HBAnyware utility installed:

1. Select **Start> Programs>Emulex>HBAnyware WebLaunch Uninstall**. The following screen appears:

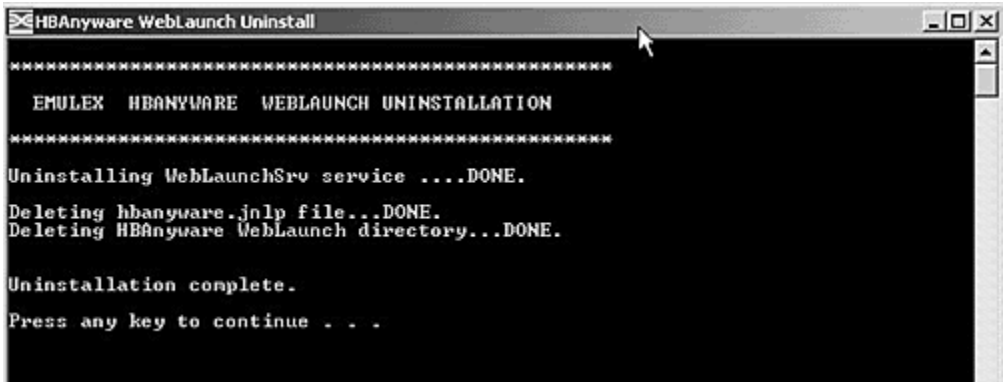


*Figure 5: HBAnyware Web Launch, Uninstallation screen*

2. HBAnyware Web Launch is removed. Press any key to continue.

## Uninstalling Programs

To uninstall the HBAnyware utilities and AutoPilot Installer on a Windows Server 2003 system:

1. Open the **Add or Remove Programs** control panel.
2. Select **Emulex HBAnyware** or **Emulex HBAnyware CLI** in the program list and click **Remove**.
3. Click **Yes**. The application is removed from the system. Click **OK**.
4. If you installed the full driver package:
    a. Select **Emulex Common SAN Management**.
    b. Click **Remove**.
    c. Click **Yes**.
    d. Uninstall_HBAnyware_CLI.bat displayed an error message "Uninstaller exited with code 0. The batch file cannot be found" at the end of the execution. The Uninstall_HBAnyware_CLI.bat did removed all the files which needed to remove. This is a document issue.
    The services are stopped and removed. Click **OK**.
5. At this point you can reinstall the utilities by running AutoPilot Installer. To remove AutoPilot Installer:
    a. Select **Emulex Storport Miniport Driver Kit** or **Emulex Storport Miniport Driver Core Kit**.
    b. Click **Remove**.
    c. Click **Yes**.
    The installer files are removed from the system. Click **OK.**

To uninstall the HBAnyware utilities and AutoPilot Installer on a Vista or Windows Server 2008 system:

1. Open the **Programs and Features** control panel.
2. Select **Emulex HBAnyware** or **Emulex HBAnyware CLI** in the program list and click the **Uninstall** icon in the tool bar above the program list. If you have User Access Control enabled, click **Continue** when asked for permission.
3. Click **Yes**. The application is removed from the system. Click **OK**.
4. If you installed the full driver package:
    a. Select **Emulex Common SAN Management**.
    b. Click the **Uninstall** icon. If you have User Access Control enabled, click **Continue** when asked for permission.
    c. Click **Yes**. The services are stopped and removed. Click **OK**.

**Note:** If you do not want to use the Control Panel, you can execute a batch file to perform the uninstallation.
The batch file is typically in “C:\Program Files\Emulex\Util\Uninstall”.
For HBAnyware, it is uninstall_HBAnyware.bat.
For HBAnyware CLI, it is uninstall_HBAnyware_CLI.bat.
For Emulex Common SAN Management, it is uninstall_CommonSAN.bat.

5. At this point you can reinstall the utilities by running AutoPilot Installer. To remove AutoPilot Installer:
    a. Select **Emulex Storport Miniport Driver Kit** or **Emulex Storport Miniport Driver Core Kit**.
    b. Click the **Uninstall** icon. If you have User Access Control enabled, click **Continue** when asked for permission.
    c. Click **Yes**. The installer files are removed from the system. Click **OK**.

To uninstall the HBAnyware utilities and AutoPilot Installer on a Server Core system:

1. cd to the “Program Files” folder on an x86 system or the “Program Files (x86)” folder on a 64-bit system.
2. cd to “Emulex\Util\Uninstall”.
3. Run “uninstall_HBAnyware_CLI.bat”. You may now delete the “Emulex\Util” folder. You may also delete the Emulex folder if it is now empty.

**Note:** Running the ininstall_HBAnyware_CLI.bat command may display the following error message:

"Uninstaller exited with code 0. The batch file cannot be found.”

Disregard this error message if it displays, as all the program files required to be removed are in fact removed.

4. To remove AutoPilot Installer, continue with the following steps.
    a. cd to the “Program Files” folder (on both x86 systems and 64-bit systems).
    b. cd to “Emulex\AutoPilot Installer”.
    c. Run “uninstall_elx_core_kit.bat”. The installer files are removed from the system.

On all platforms, the reports folder in the “Emulex\AutoPilot Installer” folder is not removed, so you can still view installation history and see which drivers have been installed on the system. You may delete the reports folder at any time if you want.

## Uninstalling the Emulex Drivers

The Emulex Storport Miniport and PLUS (ElxPlus) drivers are uninstalled using the Device Manager.

To uninstall the Emulex Storport Miniport driver:

1. Select **Start>All Programs>Administrative Tools>Computer Management**.
2. Click **Device Manager**.
3. Double-click the adapter from which you want to remove the Storport Miniport driver. A device-specific console window is displayed. Select the **Driver** tab.
4. Click **Uninstall** and click **OK** to uninstall.

To uninstall the ElxPlus driver (uninstall the ElxPlus driver only if all adapters and installations of Emulex miniport drivers are uninstalled):

After running Device Manager (steps 1 and 2 above):

1. Click the plus sign (+) next to the Emulex PLUS driver class.
2. Right-click the Emulex driver and click **Uninstall**.
3. Click **OK** in the Confirm Device Removal window.

To uninstall or update an earlier version of the Storport Miniport driver (prior to version 1.20), you must remove the registry settings for the adjunct driver prior to manually installing a new driver.

To remove the adjunct driver registry settings:

1. Browse to the Storport Miniport driver version 1.20 (or later) driver kit that you downloaded and extracted.
2. Double-click on the deladjct.reg file. A Registry Editor window appears to confirm that you want to execute deladjct.reg.
3. Click **Yes**. The elxadjct key is removed from the registry.

# Configuration

## Introduction

The Emulex Storport Miniport driver has many options that you can modify to provide for different behavior. You can set Storport Miniport driver parameters using the HBAnyware version 4.1 utility. See the HBAnyware version 4.1 User Manual for information on using this utility to configure the driver.

## Server Performance

### I/O Coalescing

I/O Coalescing is enabled and controlled by two driver parameters: CoalesceMsCnt and CoalesceRspCnt. The effect of I/O Coalescing will depend on the CPU resources available on the server. With I/O Coalescing turned on, interrupts are batched, reducing the number of interrupts and maximizing the number of commands processed with each interrupt. For heavily loaded systems, this will provide better throughput.

With I/O Coalescing turned off (the default), each I/O processes immediately, one CPU interrupt per I/O. For systems not heavily loaded, the default will provide better throughput.The following table shows recommendations based upon the number of I/Os per adapter.

**Table 4: Recommended Settings for I/O Coalescing**

| I/Os per Second | Suggested CoalesceMsCnt | Suggested CoalesceRspCnt |
|---|---|---|
| I/Os < 10000 | 0 | 8 |
| 10000 < I/Os < 18000 | 1 | 8 |
| 18000 < I/Os < 26000 | 1 | 16 |
| 1/Os > 26000 | 1 | 24 |

CoalesceMsCnt

The CoalesceMsCnt parameter controls the maximum elapsed time in milliseconds that the adapter waits before it generates a CPU interrupt. The value range is 0 - 63 (decimal) or 0x0 - 0x3F (hex). The default is 0 and disables I/O Coalescing.

CoalesceRspCnt

The CoalesceRspCnt parameter controls the maximum number of responses to batch before an interrupt generates. If CoalesceRspCnt expires, an interrupt generates for all responses collected up to that point. With CoalesceRspCnt set to less than 2, response coalescing is disabled and an interrupt triggers for each response. The value range for CoalesceRspCnt is 1 - 255 (decimal) or 0x1 - 0xFF (hex). The default value is 8.

**Note:** A system restart is required to make changes to CoalesceMsCnt and/or CoalesceRspCnt.

## Performance Testing

There are three driver parameters that need to be considered (and perhaps changed from the default) for better performance testing: QueueDepth, CoalesceMsCnt and CoalesceRspCnt.

**Note:** Parameter values recommended in this topic are for performance testing only and not for general operation.

QueueDepth

If the number of outstanding I/Os per device is expected to exceed 32, increase this parameter to a value greater than the number of expected I/Os per device, up to a maximum of 254.The QueueDepth parameter defaults to 32. If 32 is set and not a high enough value, performance degradation may occur due to Storport throttling its device queue.

CoalesceMsCnt

CoalesceMsCnt defaults to zero. If you are using a performance evaluation tool such as IOMETER and if you expect the I/O activity will be greater than 8000 I/Os per second, set CoalesceMsCnt to 1 and reinitialized with an adapter reset or system reboot.

CoalesceRspCnt

CoalesceRspCnt defaults to 8. For all other values up to the maximum of 63, the adapter will not interrupt the host with a completion until either CoalesceMsCnt milliseconds has elapsed or CoalesceRspCnt responses are pending. The value of these two driver parameters reduces the number of interrupts per second which improves overall CPU utilization. However, there is a point where the number of I/Os per second is small relative to CoalesceMsCnt and this will slow down the completion process, causing performance degradation.

**Performance Testing Examples**

Test Scenario One

You execute IOMETER with an I/O depth of 1 I/O per device in a small-scale configuration (16 devices). In this case, the test does not exceed the adapter 's performance limits and the number of I/Os per second are in the low thousands.

Recommendation: set CoalesceMsCnt to 0 (or leave the default value).

Test Scenario Two

You execute IOMETER with an I/O depth of 48 I/Os per device in a small-scale configuration (16 devices).

Recommendation: set QueueDepth to be greater than 48 (e.g. 64).

# Driver Parameters for Windows

The parameter values listed in Table 5 are applicable to Storport Miniport driver versions 2.20 or later. If you are using a version previous to 2.20, see the Storport Miniport Driver User Manual for that version's parameter information.

**Activation Requirements**

A parameter has one of the following activation requirements:

- Dynamic - The change takes effect while the system is running.
- Reset - Requires an adapter reset from the utility before the change takes effect.
- Reboot - Requires reboot of the entire machine before the change takes effect. In this case, you are prompted to perform a reboot when you exit the utility.

The Driver Parameter table provides information such as the allowable range of values and factory defaults. Parameters can be entered in decimal or hexadecimal format.

**Note:** If you are creating custom unattended installation scripts, any driver parameter can be modified and included in the script.

Most parameters default to a setting that optimizes adapter performance.

**Table 5: Storport Miniport Driver Parameters**

| Parameter | Definitions | Activation Requirement |
|---|---|---|
| AutoMap=**n** | AutoMap controls the way targets are assigned SCSI IDs. Discovered targets are assigned persistent SCSI IDs according to the selected binding method. Persistent bindings do not take effect with the driver in stand-alone mode.<br><br>If set to 0 = automap is disabled. Uses the HBAnyware utility to persistently set the SCSI address of a discovered FCP capable FC node (target).<br>If set to 1 = automap by WWNN.<br>If set to 2 = automap by WWPN.<br>If set to 3 = automap by DID<br><br>Value: 0 - 3<br>Default = 2 | Reboot |
| Class=**n** | Class selects the class of service on FCP commands.<br>If set to 2, class = 2.<br>If set to 3, class = 3.<br><br>Value: 2 - 3<br>Default = 3 | Dynamic |
| CoalesceMsCnt=**n** | CoalesceMsCn specifies wait time in milliseconds to generate an interrupt response if CoalesceRspCnt has not been satisfied. Zero specifies an immediate interrupt response notification. A non-zero value enables response coalescing at the specified interval in milliseconds.<br><br>Value: 0 - 63 (decimal) or 0x0 - 0x3F (hex)<br>Default = 0 (0x0) | Reset |

**Table 5: Storport Miniport Driver Parameters (Continued)**

| Parameter | Definitions | Activation Requirement |
|---|---|---|
| CoalesceRspCnt=**n** | CoalesceRspCn specifies the number of response entries that trigger an Interrupt response.<br><br>Value: 0 - 255 (decimal) or 0x1 - 0xFF (hex)<br>Default = 8 (0x8) | Reset |
| DiscoveryDelay=**n** | DiscoveryDelay controls whether the driver waits for 'n' seconds to start port discovery after link up.<br><br>If set to 0 = immediate discovery after link up.<br>If set to 1 or 2 = the number of seconds to wait after link-up before starting port discovery.<br><br>Value: 0 - 2 seconds (decimal)<br>Default = 0. | Dynamic |
| EnableAck0=**n** | Set to 1 to force sequence rather than frame level acknowledgement for class 2 traffic over an exchange. This applies to FCP data exchanges on IREAD and IWRITE commands.<br><br>Value: 0 - 1 (decimal)<br>Default = 0 | Reset |
| EnableAUTH | EnableAUTH enables fabric authentication. This feature requires the authentication to be supported by the fabric. Authentication is enabled when this value is set to 1.<br><br>Value: 0 - 1<br>Default = 0 | Reboot |
| EnableFDMI=**n** | If set to 1, enables management server login on fabric discovery. This allows Fabric-Device Management Interface (FDMI) to operate on switches that have FDMI-capable firmware.<br>If set to 2, FDMI operates and uses the host name feature of FDMI.<br><br>Value: 0 -2 (decimal)<br>Default = 0 | Reset |
| EnableNPIV=**n** | If set to 1, enables N_Port_ID virtualization (NPIV). Requires NPIV supported firmware for the adapter.<br><br>Value: 0 -1<br>Default = 0 (disabled)<br><br>**Note:** To run the driver using NPIV or SLI-3 optimization, the firmware must be version 2.72a0 or later. If an earlier version is used, the driver runs in SLI-2 mode and does not support NPIV.<br><br>**Note:** NPIV is not available on 1Gb/s and 2 Gb/s HBAs. | Reset |

**Table 5: Storport Miniport Driver Parameters (Continued)**

| Parameter | Definitions | Activation Requirement |
|---|---|---|
| ExtTransferSize | ExtTransferSize is an initialization-time parameter that affects the maximum SGL that the driver can handle, which determines the maximum I/O size that a port will support. At the default of 0, the maximum transfer size is 512KB. With a value of 1, the maximum transfer size is 1MB. With a value of 2, the maximum transfer size is 2MB.<br><br>Value: 0 - 2<br>Default = 0 (disabled) | Reboot |
| FrameSizeMSB=**n** | FrameSizeMSB controls the upper byte of receive FrameSize if issued in PLOGI. This allows the FrameSize to be constrained on 256-byte increments from 256 (1) to 2048 (8).<br><br>Value: 0 - 8<br>Default = 0 | Reset |
| InitTimeout=**n** | Determines the number of time-out seconds during driver initialization for the link to come up. If the link fails to come up by InitTimeout, driver initialization exits but is still successful. If the link comes up before InitTimeout, the driver sets double the amount for discovery to complete.<br><br>Value: 5 -30 seconds or 0x5 - 0x1E (hex)<br>Default = 15 seconds (0xF) | Reboot |
| LinkSpeed**=n** | LinkSpeed has significance only if the adapter supports speeds other than one Gb/s.<br><br>Value: Auto-select, 1 Gb/s, 2 Gb/s, 4 Gb/s, 8 Gb/s<br>Default = Auto-select<br><br>**Note:** Setting this option incorrectly can cause the HBA to fail to initialize. | Reset |
| LinkTimeOut=**n** | LinkTimeOut applies to a private loop only. A timer is started on all mapped targets using the link timeout value. If the timer expires before discovery is re-resolved, commands issued to timed out devices returns a SELECTIION_TIMEOUT. The Storport driver is notified of a Bus change event which leads to the removal of all LUNs on the timed out devices.<br><br>Value: 1 - 500 seconds or 0x0 - 0xFE (hex)<br>Default = 30 (0x1E) | Dynamic |

**Table 5: Storport Miniport Driver Parameters (Continued)**

| Parameter | Definitions | Activation Requirement |
|---|---|---|
| LogErrors=**n** | LogErrors determine the minimum severity level required to enable entry of a logged error into the system event log. Errors are classified as severe, malfunction or command level. A severe error requires user intervention to correct a firmware or adapter problem. An invalid link speed selection is an example of a severe error. A malfunction error indicates that the system has problems, but user intervention is not required. An invalid fabric command type is an example of a malfunction error. A command level error: an object allocation failure is an example of a command error.<br><br>If set to 0, all errors are logged.<br>If set to 1, command level errors are logged.<br>If set to 2, malfunction errors are logged.<br>If set to 3, severe errors are logged.<br><br>Value: 0 - 3<br>Default = 3 | Dynamic |
| NodeTimeout=**n** | The node timer starts when a node (i.e. discovered target or initiator) becomes unavailable. If the node fails to become available before the NodeTimeout interval expires, the OS is notified so that any associated devices (if the node is a target) can be removed. If the node becomes available before NodeTimeout expires the timer is canceled and no notification is made.<br><br>Value: 1 - 255 seconds or 0x0 - 0xFF (hex)<br>Default = 30 (0x1E) | Dynamic |
| PerPortTrace | PerPortTrace enables driver tracing for a single adapter port. It is a diagnostic tool and may be used by developers or Technical Support. While global tracing is always enabled for all ports, per port tracing is more specific and temporary.<br><br>Value: 1- 2<br>Default = 0 (disabled) | Dynamic |
| QueueDepth=**n** | QueueDepth requests per LUN/target (see QueueTarget parameter). If you expect the number of outstanding I/Os per device to exceed 32, then you must increase to a value greater than the number of expected I/Os per device (up to a value of 254). If the QueueDepth value is set too low, a performance degradation can occur due to driver throttling of its device queue.<br><br>Value: 1 - 254 or 0x1 - 0xFE (hex)<br>Default = 32 (0x20) | Dynamic |

**Table 5: Storport Miniport Driver Parameters (Continued)**

| Parameter | Definitions | Activation Requirement |
|---|---|---|
| QueueTarget=**n** | QueueTarget controls I/O depth limiting on a per target or per LUN basis.<br><br>If set to 0 = depth limitation is applied to individual LUNs.<br>If set to 1 = depth limitation is applied across the entire target.<br><br>Value: 0 -1 or 0x0 - 0x1 (hex)<br>Default = 0 (0x0) | Dynamic |
| RmaDepth=**n** | RmaDepth sets the remote management buffer queue depth. The greater the depth, the more concurrent management controls can be handled by the local node.<br><br>Value: 8 - 64, or 0x8 - 0x40 (hex)<br>Default = 16 (0x10)<br><br>**Note:** The RmaDepth driver parameter pertains to the functionality of the HBAnyware utility. | Reboot |
| ScanDown=**n** | If set to 0 = lowest AL_PA = lowest physical disk (ascending AL_PA order).<br>If set to 1 = highest AL_PA = lowest physical disk (ascending SEL_ID order).<br><br>Value: 0 - 1<br>Default = 0<br><br>**Note:** This option applies to private loop only in DID mode. | Reboot |
| SLIMode=**n** | If set to 0 = autoselect firmware, use the newest firmware installed.<br>If set to 2 = implies running the HBA firmware in SLI-2 mode.<br>If set to 3 = implies running the HBA firmware in SLI-3 mode.<br><br>Value: 0, 2 and 3<br>Default = 0 | Reboot |
| Topology=**n** | Topology values can be 0 to 3.<br>If set to 0 (0x0) = FC Arbitrated Loop (FC-AL).<br>If set to 1 (0x1) = PT-PT fabric.<br>If set to 2 (0x2) = *FC-AL first, then attempt PT-PT.<br>If set to 3 (0x3) = *PT-PT fabric first, then attempt FC-AL.<br><br>* Topology fail-over requires v3.20 firmware or higher. If firmware does not support topology fail-over, options 0,2 and 1,3 are analogous.<br><br>Value: 0 - 3<br>Default = 2 (0x2) | Reset |

**Table 5: Storport Miniport Driver Parameters (Continued)**

| Parameter | Definitions | Activation Requirement |
|---|---|---|
| TraceBufSiz=**n** | TraceBufSiz sets the size in bytes for the internal driver trace buffer. The internal driver trace buffer acts as an internal log of the driver's activity.<br><br>Value: 250,000 - 2,000,000 or 0x3D090 - 0x1E8480 (hex).<br>Default = 250,000 (0x3D090) | Reboot |

# Troubleshooting

## Introduction

There are several circumstances in which your system may operate in an unexpected manner. The Troubleshooting section contains reference tables on event codes and error messages and provides information regarding unusual situations.

### Event Tracing (Windows Server 2003, SP1 and later only)

Trace messages are part of the Emulex lpfc log messages.

Storage Event Tracing supports two types of events:

- FFInit (0x00000001) - events that occurred at HwFindAdapter and HwInitialize.
- FFIo (0x00000002) - events that occurred during I/O.

Storage Event Tracing supports four levels of events:

- DbgLvlErr (0x00000001) - error level
- DbGLvlWrn (0x00000002) - warning level
- DbgLvlInfo (0x00000004) - Information level
- DbgLvlInfo (0x00000008) - excessive information level

**Note:** To view trace messages, you must enable Event Tracing in the operating system. See your Microsoft operating system documentation for more information.

**Table 6: Event Tracing Summary Table**

| LOG Message Definition | From | To | Reserved Through | Verbose Description |
|---|---|---|---|---|
| ELS | 0100 | 0130 | 0199 | ELS events |
| Discovery | 0202 | 0262 | 0299 | Link discovery events |
| Mailbox | 0310 | 0326 | 0399 | Mailbox events |
| INIT | 0400 | 0463 | 0499 | Initialization events |
| FCP | 0701 | 0749 | 0799 | FCP traffic history events |
| Link | 1300 | 1306 | 1399 | Link events |
| Tag | 1400 | 1401 | 1499 | |
| NPIV | 1800 | 1804 | 1800 | N_Port_ID virtualization events |

## Event Trace Messages

### ELS Log Messages (0100 - 0130)

lpfc_mes0100: 0100: FLOGI failure - ulpStatus: x%x, ulpWord[4]:x%x

DESCRIPTION: An ELS FLOGI command that was sent to the fabric failed.
SEVERITY: Error
LOG: LOG_ELS verbose
ACTION: Check fabric connection.
SEE ALSO: lpfc_mes0110.

lpfc_mes0101: 0101: FLOGI completes successfully - NPortId: x%x, RaTov: x%x, EdTov: x%x

DESCRIPTION: An ELS FLOGI command that was sent to the fabric succeeded.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0102: 0102: PLOGI completes to NPortId: x%x

DESCRIPTION: The adapter performed a PLOGI into a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0103: 0103:PRLI completes to NPortId: x%x, TypeMask: x%x, Fcp2Recovery: x%x

DESCRIPTION: The adapter performed a PRLI into a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0104: 0104: ADISC completes to NPortId x%x

DESCRIPTION: The adapter performed an ADISC into a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0105: 0105: LOGO completes to NPortId: x%x

DESCRIPTION: The adapter performed a LOGO into a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0112: 0112: ELS command: x%x, received from NPortId: x%x

DESCRIPTION: Received the specific ELS command from a remote NPort.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.
REMARKS: lpfc_mes0114 and lpfc_mes0115 are also recorded for more details if the corresponding SEVERITY level is set. You can use the XRI to match the messages.

lpfc_mes0114: 0114: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its FC service parameters match this adapter. Request can be accepted.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0112.

lpfc_mes0115: 0115: Unknown ELS command: x%x, received from NPortId: x%x\n

DESCRIPTION: Received an unsupported ELS command from a remote NPORT.
SEVERITY: Error
LOG: LOG_ELS verbose
ACTION: Check remote NPORT for potential problem.
SEE ALSO: lpfc_mes0112.

lpfc_mes0128: 0128: Accepted ELS command: OpCode: x%x

DESCRIPTION: Accepted ELS command from a remote NPORT.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0129: 0129: Rejected ELS command: OpCode: x%x

DESCRIPTION: Rejected ELS command from a remote NPORT.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0130: 0130: ELS command error: ulpStatus: x%x, ulpWord[4]: x%x

DESCRIPTION: ELS command failure
SEVERITY: Error
LOG: LOG_ELS verbose
ACTION: Check remote NPORT for potential problem.

## Discovery Log Messages (0202 - 0262)

lpfc_mes0202: 0202: Start Discovery: Link Down Timeout: x%x, initial PLOGICount:%d

DESCRIPTION: Device discovery/rediscovery after FLOGI, FAN or RSCN has started. TMO is the current value of the soft link time. It is used for link discovery against the LinkDownTime set in parameters. DISC CNT is number of nodes being discovered for link discovery. RSCN CNT is number of nodes being discovered for RSCN discovery. There will be value in either DISC CNT or RSCN CNT depending which discovery is being performed.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0204: 0204: Discovered SCSI Target: WWN word 0: x%x, WWN word 1: x%x, DID: x%x:, RPI: x%x

DESCRIPTION: Device discovery found SCSI target.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0214: 0214: RSCN received: Word count:%d

DESCRIPTION: Received RSCN from fabric.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0215: 0215: RSCN processed: DID: x%x

DESCRIPTION: Processed RSCN from fabric.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0225: 0225: Device Discovery completes

DESCRIPTION: This indicates successful completion of device (re)discovery after a link up.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0229: 0229: Assign SCSIId x%x to WWN word 0: x%x, WWN word 1: x%x, NPortId x%x

DESCRIPTION: The driver assigned a SCSI ID to a discovered mapped FCP target. BindType - 0: DID 1:WWNN 2:WWPN
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

lpfc_mes0230: 0230: Cannot assign SCSIId to WWN word 0: x%x, WWN word 1: x%x, NPortId x%x

DESCRIPTION: SCSI ID assignment failed for discovered target.
SEVERITY: Warning
LOG: LOG_ELS verbose
ACTION: Review system configuration.

lpfc_mes0232: 0232: Continue discovery at sequence number%d, PLOGIs remaining:%d

DESCRIPTION: NPort discovery sequence continuation.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

### lpfc_mes0235: 0235: New RSCN being deferred due to RSCN in process

DESCRIPTION: An RSCN was received while processing a previous RSCN.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

### lpfc_mes0236: 0236: Issuing command to name server" type: x%x

DESCRIPTION: The driver is issuing a nameserver request to the fabric. Also recorded if a GID_FT is sent.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0239 or lpfc_mes0240.

### lpfc_mes0238: 0238: NameServer response DID count:%d

DESCRIPTION: Received a response from fabric name server with N DIDs.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

### lpfc_mes0239: 0239: NameServer Response: next DID value: x%x

DESCRIPTION: The driver received a nameserver response. And, this message is recorded for each DID included in the response data.
SEVERITY: Information
LOG: LOG_DISCOVERY verbose
ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0236.

### lpfc_mes0240: 0240: NameServer Response Error - CmdRsp:x%x, ReasonCode: x%x, Explanation x%x

DESCRIPTION: The driver received a nameserver response containing a status error.
SEVERITY: Error
LOG: LOG_DISCOVERY verbose
ACTION: Check Fabric configuration. The driver recovers from this and continues with device discovery.
SEE ALSO: lpfc_mes0236.

### lpfc_mes0256: 0256: Start node timer on NPortId: x%x, timeout value:%d

DESCRIPTION: Starting timer for disconnected target with NPort ID and timeout value.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

### lpfc_mes0260: 0260: Stop node timer on NPortId: x%x, SCSIId: x%x

DESCRIPTION: Discontinuing timer for reconnected target with NPort ID and SCSI ID.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0262: 0262: Node timeout on NPortId: x%x, SCSIId: x%x

DESCRIPTION: Disconnected NPort ID, SCSI ID has failed to reconnect within timeout limit.
SEVERITY: Error
LOG: LOG_ELS verbose
ACTION: Review system configuration.

## Mailbox Log Messages (0310 - 0326)

lpfc_mes0310: 0310: Mailbox command timeout - HBA unresponsive

DESCRIPTION: A Mailbox command was posted to the adapter and did not complete within 30 seconds. sync - 0: asynchronous mailbox command is issued 1: synchronous mailbox command is issued.
SEVERITY: Error
LOG: LOG_MBOX verbose
ACTION: This error could indicate a software driver or firmware problem. If no I/O is going through the adapter, reboot the system. If these problems persist, report these errors to Technical Support.

lpfc_mes0326: 0326: Reset HBA - HostStatus: x%x

DESCRIPTION: The adapter has been reset.
SEVERITY: Information
LOG: LOG_MBOX verbose
ACTION: No action needed, informational.

## INIT Log Messages (0400 - 0463)

lpfc_mes0400: 0400 Initializing discovery module: OptionFlags: x%x

DESCRIPTION: Driver discovery process is being initialized with internal flags as shown.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0401: 0401: Initializing SLI module: DeviceId: x%x, NumMSI:%d

DESCRIPTION: PCI function with device id and MSI count as shown is being initialized for service level interface.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0405: Service Level Interface (SLI) 2 selected\n");

DESCRIPTION: Service Level Interface level 2 is selected.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0406: 0406: Service Level Interface (SLI) 3 selected\n");

DESCRIPTION: Service Level Interface level 3 is selected.
SEVERITY: Information
LOG: LOG_ELS verbose
ACTION: No action needed, informational.

lpfc_mes0436: Adapter not ready: hostStatus: x%x

DESCRIPTION: The adapter failed during powerup diagnostics after it was reset.
SEVERITY: Error
LOG: LOG_INIT verbose
ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0442: 0442: Adapter failed to init, CONFIG_PORT, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing CONFIG_PORT mailbox command.
SEVERITY: Error
LOG: LOG_INIT verbose
ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0446: 0446: Adapter failed to init, CONFIG_RING, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing CFG_RING mailbox command.
SEVERITY:
LOG: LOG_INIT verbose
ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0454: 0454: Adapter failed to init, INIT_LINK, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing INIT_LINK mailbox command.
SEVERITY: Error
LOG: LOG_INIT verbose
ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0458: 0458: Bring Adapter online

DESCRIPTION: The FC driver has received a request to bring the adapter online. This may occur when running HBAnyware.
SEVERITY: Warning
LOG: LOG_INIT verbose
ACTION: None required.

lpfc_mes0460: 0460: Bring Adapter offline

DESCRIPTION: The FC driver has received a request to bring the adapter offline. This may occur when running HBAnyware.
SEVERITY: Warning
LOG: LOG_INIT verbose
ACTION: None required.

lpfc_mes0463: 0463: Adapter firmware error: hostStatus: x%x, Info1(0xA8): x%x, Info2 (0xAC): x%x

DESCRIPTION: The firmware has interrupted the host with a firmware trap error.
SEVERITY: Error
LOG: LOG_INIT verbose
ACTION: Review HBAnyware diagnostic dump information.

## FCP Log Messages (0701 - 0749)

### lpfc_mes0701: 0701: Issue Abort Task Set to PathId: x%x, TargetId: x%x, Lun: x%x

DESCRIPTION: The driver has issued a task management command for the indicated SCSI device address.
SEVERITY: Warning
LOG: LOG_INIT verbose
ACTION: Review system configuration.

### lpfc_mes0703: 0703: Issue LUN reset to PathId: x%x, TargetId: x%x, Lun: x%x, Did: x%x

DESCRIPTION: Storport is requesting a reset of the indicated LUN.
SEVERITY: Warning
LOG: LOG_INIT verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.

### lpfc_mes0713: 0713: Issued Target Reset to PathId:%d, TargetId:%d, Did: x%x

DESCRIPTION: Storport detected that it needs to abort all I/O to a specific target. This results in login reset to the target in question.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
SEE ALSO: lpfc_mes0714.

### lpfc_mes0714: 0714: Issued Bus Reset for PathId:%d

DESCRIPTION: Storport is requesting the driver to reset all targets on this adapter.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
SEE ALSO: lpfc_mes0713.

### lpfc_mes0716: 0716: FCP Read Underrun, expected%d, residual%d

DESCRIPTION: FCP device provided less data than was requested.
SEVERITY: Supplement Information
LOG: LOG_FCP verbose
ACTION: No action needed, informational.
SEE ALSO: lpfc_mes0730.

### lpfc_mes0729: 0729: FCP command error: ulpStatus: x%x, ulpWord[4]: x%x, XRI: x%x, ulpWord[7]: x%x

DESCRIPTION: The specified device failed an I/O FCP command.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Check the state of the target in question.
REMARKS: lpfc_mes0730 is also recorded if it is a FCP Rsp error.

lpfc_mes0730: 0730: FCP response error: Flags: x%x, SCSI status: x%x, Residual:%d

DESCRIPTION: The FCP command failed with a response error.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Check the state of the target in question.
remark: lpfc_mes0716, lpfc_mes0734, lpfc_mes0736 or lpfc_mes0737 is also recorded for more details if the corresponding SEVERITY level is set.
SEE ALSO: lpfc_mes0729.

lpfc_mes0734: 0734: Read Check: fcp_parm: x%x, Residual x%x

DESCRIPTION: The issued FCP command returned a Read Check Error.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Check the state of the target in question.
SEE ALSO: lpfc_mes0730.

lpfc_mes0737: 0737: SCSI check condition, SenseKey x%x, ASC x%x, ASCQ x%x, SrbStatus: x%x

DESCRIPTION: The issued FCP command resulted in a Check Condition.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review SCSI error code values.
SEE ALSO: lpfc_mes0730.

0747: Target reset complete: PathId: x%x, TargetId: x%x, Did: x%x

DESCRIPTION: A target reset operation has completed.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
REMARK: See also Message 0713.

0748: Lun reset complete: PathId: x%x, TargetId: x%x, Lun: x%x

DESCRIPTION: A LUN reset operation has completed.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
REMARK: See also Message 0703.

0749: Abort task set complete: Did: x%x, SCSIId: x%x

DESCRIPTION: A task management has completed.
SEVERITY: Warning
LOG: LOG_FCP verbose
ACTION: Review system configuration. Possible side-effect of cluster operations.
REMARK: See also Message 0701.

## Link Log Messages (1302 - 1306)

lpfc_mes1302: 1302: Invalid speed for this board:%d, forced link speed to auto

DESCRIPTION: The driver is re-initializing the link speed to auto-detect.
SEVERITY: Warning
LOG: LOG_LINK_EVENT verbose
ACTION: None required.

lpfc_mes1303: 1303: Link Up event: tag: x%x, link speed:%dG, topology (0 = Pt2Pt, 1 = AL):%d

DESCRIPTION: A link up event was received. It is also possible for multiple link events to be received together.
SEVERITY: Error
LOG: LOG_LINK_EVENT verbose
ACTION: If numerous link events are occurring, check physical connections to the FC network.
REMARKS: lpfc_mes1304 is recorded if Map Entries > 0 and the corresponding mode and SEVERITY level is set.

lpfc_mes1305:1305: Link down even: tag x%x

DESCRIPTION: A link down event was received.
SEVERITY: Error
LOG: LOG_LINK_EVENT verbose
ACTION: If numerous link events are occurring, check physical connections to the FC network.

lpfc_mes1306: 1306: Link Down timeout

DESCRIPTION: The link was down for greater than the configuration parameter (HLinkTimeOut) seconds. All I/O associated with the devices on this link will be failed.
SEVERITY: Warning
LOG: LOG_LINK_EVENT verbose
ACTION: Check adapter cable/connection to SAN.

## Tag Messages (1400 - 1401)

lpfc_mes1400 1400: Tag out of range: ContextIndex: x%x, MaxIndex: x%x, ulpCommand: x%x

DESCRIPTION: Firmware has generated an invalid response.
SEVERITY: Error
LOG: LOG_LINK_EVENT verbose
ACTION: Review hardware configuration. Contact Emulex Technical Support.

lpfc_mes1401 1401: Invalid tag: ContextIndex: x%x, ulpCommand: x%x

DESCRIPTION: Firmware has generated an invalid response.
SEVERITY: Error
LOG: LOG_LINK_EVENT verbose
ACTION: Review hardware configuration. Contact Emulex Technical Support.

## NPIV Messages (1800 - 1899)

lpfc_mes1800 1800: NPIV FDISC failure VPI: x%x Error x%x Reason x%x

DESCRIPTION: Virtual Port fails on a FDISC to the switch with the error and reason listed.
SEVERITY: Error
LOG: LOG_NPIV verbose
ACTION: Check to ensure the switch supports NPIV.

lpfc_mes1801 1801: Memory allocation failure for NPIV port: x%x

DESCRIPTION: Fails to allocated the block of memory for the Virtual Port.
SEVERITY: Error
LOG: LOG_NPIV verbose
ACTION: Check to ensure system has sufficient kernel memory.

lpfc_mes1802 1802: Exceeded the MAX NPIV port: x%x

DESCRIPTION: Exceeded the number of Virtual Port allows on the HBA.
SEVERITY: Error
LOG: LOG_NPIV verbose
ACTION: Reduce the number of Virtual Ports.

lpfc_mes1803 1803: Virtual Port: x%x VPI:x%x successfully created.

DESCRIPTION: Virtual Port ID is successfully created.
SEVERITY: Information
LOG: LOG_NPIV verbose
ACTION: No action needed, informational.

lpfc_mes1804 1804: Removing Virtual Port: x%x VPI:x%x

DESCRIPTION: Removing Virtual Port ID.
SEVERITY: Information
LOG: LOG_NPIV verbose
ACTION: No action needed, informational.

## ELS Messages (1900 - 1999)

1900: x%x sends ELS_AUTH_CMD x%x with TID x%x

DESCRIPTION: An ELS_AUTH_CMD is sent.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational.

1901: x%x sends ELS_AUTH_REJECT x%x x%x to x%x

DESCRIPTION: An ELS_AUTH_REJECT is sent.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational.

1902: Receives x%x from x%x in state x%x

DESCRIPTION: Receives an ELS_AUTH_CMD.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational.

1903: Receives ELS_AUTH_RJT x%x x%x

DESCRIPTION: Receives an ELS_AUTH_REJECT.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational.

1904: Authentication ends for x%x with status x%x (%d %d)

DESCRIPTION: Authentication is done.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational.

1905: Authentication policy change for local x%08x x%08x remote x%08x%08x

DESCRIPTION: Authentication policy has been changed.
SEVERITY: Information
LOG: LOG_FCSP verbose
ACTION: No action needed, informational.

# Error Log

## Viewing the Error Log

The system event log is a standard feature of Windows Server 2003. All events logged by the Emulex Storport Miniport will be Event ID 11 with source “elxstor”.

To view the error LOG:

1. Open the Event Viewer window:
   - Click **Start>Programs>Administrative Tools>Event Viewer**

     or
   - Right-click on **My Computer**, **Manage** and **Event Viewer** in **Computer Management**.

   The Event Viewer window is displayed.
2. Double-click any event with the source name ELXSTOR.
3. Examine the entry at offset 0x10 and Event ID 11. The Emulex event code is found in byte 0010 and supplementary data is in the byte offsets 0011 through 0013 (in example Figure 6, byte 0010 = 9b, byte 0011 = 00, byte 0012 = 29 and byte 0013 = 00).

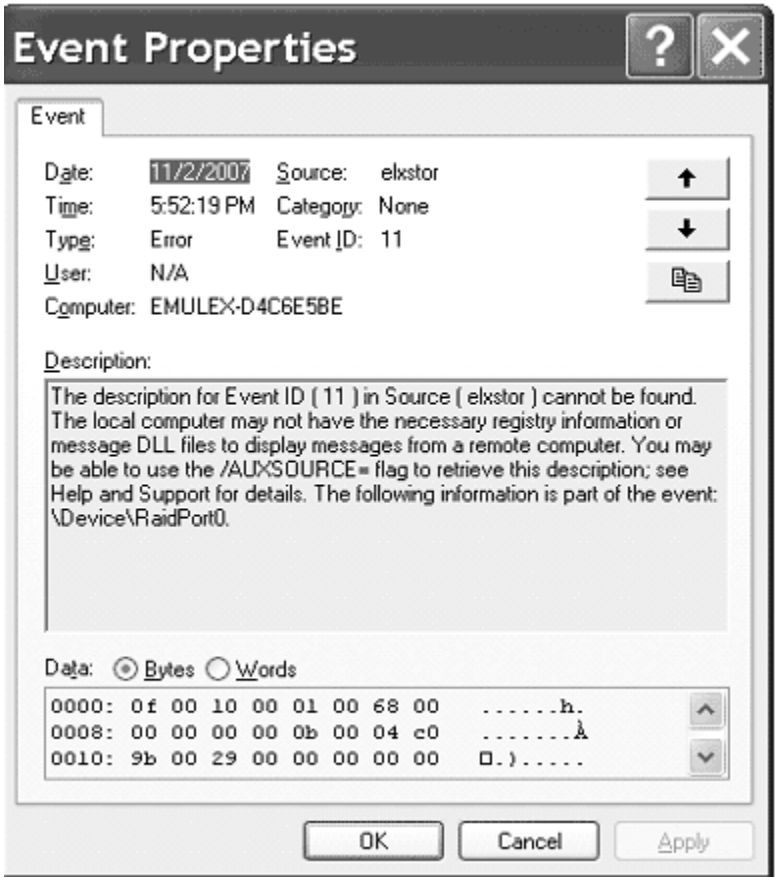
Event Properties
Event
Date: 11/2/2007
Source: elxstor
Time: 5:52:19 PM
Category: None
Type: Error
Event ID: 11
User: N/A
Computer: EMULEX-D4C6E5BE
Description:
The description for Event ID ( 11 ) in Source ( elxstor ) cannot be found. The local computer may not have the necessary registry information or message DLL files to display messages from a remote computer. You may be able to use the /AUXSOURCE= flag to retrieve this description; see Help and Support for details. The following information is part of the event: \Device\RaidPort0.
Data: Bytes Words
0000: 0f 00 10 00 01 00 68 00 ......h.
0008: 00 00 00 00 0b 00 04 c0 .......À
0010: 9b 00 29 00 00 00 00 00 □.).....
OK
Cancel
Apply

*Figure 6: Event Properties*

## Severity Scheme

When the Event Viewer is launched, there are three branches: Application, Security and System. All ELXSTOR error log entries are found under the System branch and all ELXSTOR error log entries have the Event Viewer severity level of “error”.

- A severe error code indicates that the driver, firmware or adapter is behaving abnormally and your intervention is required to correct the problem.
- A malfunction error code indicates that there is a problem with the system, but your intervention is not required.
- A command error code indicates that an event has transpired, but does not require your intervention. An event may be problem-oriented, such as an invalid fabric command sub-type. An event may not be problem-oriented, such as exhausted retries on PLOGI or PDISC.

## Related Driver Parameter: LogError

The LogError driver parameter determines the minimum severity level to enable entry of a logged error into the system.

- If set to 0 = all errors regardless of severity are logged.
- If set to 1 = severe, malfunction and command level errors are logged.
- If set to 2 = both severe and malfunction errors are logged.
- If set to 3 = only severe errors are logged.

**Note:** See the Configuration Section for instructions on how to set driver parameters.

**Note:** Set LogError to 1 if you are troubleshooting SAN connectivity or device discovery issues.

## Format of an Error Log Entry

An error log entry will take the form of an event.This event is described by:

- Date (date entry was logged)
- Source (elxstor)
- Time (time entry was logged)
- Category (none)
- Type (error)
- Event d (0)
- User (N/A)
- Computer (name of computer)

## Error Codes Tables

**Table 7: Severe Errors**

| Bits 0 -7 | Interpretation |
|---|---|
| 0x00 | Failed to allocate PCB |
| 0x01 | Failed to allocate command ring |
| 0x02 | Failed to allocate response ring |
| 0x03 | Failed to allocate mailbox context |
| 0x04 | Read revision failed |
| 0x05 | Invalid adapter type |
| 0x06 | Invalid adapter type |
| 0x07 | Write of non-volatile parameters failed |
| 0x08 | Invalid link speed selection |
| 0x09 | Read configuration failed |
| 0x0A | Set variable failed |
| 0x0B | Configure port failed |
| 0x0D | Configure ring 0 failed |
| 0x0E | Configure ring 1 failed |
| 0x0F | Configure ring 2 failed |
| 0x10 | Configure ring 3 failed |
| 0x11 | Initialize link failed |
| 0x12 | Port ready failed |
| 0x13 | Read revision failed |
| 0x14 | Invalid adapter type |
| 0x15 | Invalid adapter type |
| 0x17 | Set variable command failed |
| 0x18 | Configure port failed |
| 0x19 | Configure ring 0 failed |
| 0x1A | Configure ring 1 failed |
| 0x1B | Configure ring 2 failed |
| 0x1C | Configure ring 3 failed |
| 0x1E | Context pool initialization failure |
| 0x1F | Context pool initialization failure |
| 0x20 | Context pool initialization failure |
| 0x24 | Firmware trap: fatal adapter error, Contact Emulex Technical Support - If HBAnyware is installed, check for FW dump in C:\Program Files\Emulex\Util\Dump |
| 0x25 | Non-specific fatal adapter error, FW error attention information ccbbaa will be posted with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc - contact Emulex Technical Support |
| 0x27 | FCoE chip is running Golden firmware |
| 0x28 | FCoE chip is running Diagnostic firmware |
| 0x29 | Recoverable adapter error: device has been auto-restarted |
| 0x2A | Mailbox command time-out |

**Table 7: Severe Errors (Continued)**

| Bits 0 -7 | Interpretation |
|---|---|
| 0x2B | Invalid FRU data found on adapter, contact Blade Vendor for procedure to reinstall firmware on Emulex Mezzanine Card |
| 0x2D | Invalid-Illegal response IOCB |
| 0x2E | Invalid-response IOCB |
| 0X2F | Invalid-response IOCB |
| 0x30 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x34 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x35 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x37 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x3D | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x41 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x42 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x44 | ELS FLOGI command context allocation failure, contact Emulex Technical Support. |
| 0x47 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x4D | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x51 | Request to ADISC a non-existent node |
| 0x52 | ELS ADISC command context allocation failure, contact Emulex Technical Support. |
| 0x56 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x57 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x58 | ELS LOGO command context allocation failure, contact Emulex Technical Support. |
| 0x5C | ELS PRLI command context allocation failure, contact Emulex Technical Support. |
| 0x5E | ELS RLIR command context allocation failure, contact Emulex Technical Support. |
| 0x64 | Create XRI command context allocation failure, contact Emulex Technical Support. |
| 0x67 | Name server command context allocation failure, contact Emulex Technical Support. |
| 0x6E | Close XRI command context allocation failure, contact Emulex Technical Support. |
| 0x6F | State change registration failure |
| 0x70 | ELS receive context allocation failure, contact Emulex Technical Support. |
| 0x72 | ELS receive PLOGI context allocation failure, contact Emulex Technical Support. |
| 0x74 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x77 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x7A | ELS receive LOGO context allocation failure, contact Emulex Technical Support. |
| 0x7D | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x7E | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x7F | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x80 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x81 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x84 | ELS FDISC context allocation failure, contact Emulex Technical Support. |
| 0x85 | Mailbox context allocation failure, contact Emulex Technical Support. |
| 0x88 | ELS PLOGI command context allocation failure, contact Emulex Technical Support. |

**Table 7: Severe Errors (Continued)**

| Bits 0 -7 | Interpretation |
|---|---|
| 0x89 | ELS RSCN registration command context allocation failure, contact Emulex Technical Support. |
| 0xA0 | Port object construction failed |
| 0xA4 | Unsupported IOCB command code aa with byte 0x11=aa |
| 0xC0 | Failed to allocate un-cached extension |
| 0xC1 | Port initialization failure |
| 0xC2 | Utility mailbox command timeout |
| 0xC3 | Fatal over-temperature condition |
| 0xC4 | Over-temperature warning condition |
| 0xC5 | Over-temperature warning condition alleviated |
| 0xC6 | Invalid response IOCB |
| 0xC7 | Initialization failed due to exceeding max driver instances (256) |
| 0xC8 | Initialization failed due to STORPORT.SYS revision level too low. Installed Microsoft KB level must be 932755 or higher - if such KB is not installed, the driver installation kit will not load the 2.20 driver. |
| 0xEC | Failed to allocate authentication context |

**Table 8: Malfunction Errors**

| Bits 0 - 7 | Interpretation |
|---|---|
| 0x0C | Set variable failed |
| 0x26 | Spurious mailbox attention |
| 0x31 | Unrecognized mailbox completion command code |
| 0x33 | Invalid link state |
| 0x36 | Initialization command failed (status in bits 8 -31) |
| 0x3B | Discovery error due to lack of resources (insufficient RPIs) |
| 0x3E | Unable to create discovered node object |
| 0x3F | Failed to issue ELS process login (PRLI) command. |
| 0x45 | Retries exhausted to ELS FLOGI |
| 0x47 | Failed to issue UNREG_VPI |
| 0x48 | No exchange available for extended link service request (ELS) command |
| 0x4C | Exhausted retries on ELS PLOGI |
| 0x53 | WWPN mismatch on ADISC response |
| 0x54 | WWNN mismatch on ADISC response |
| 0x55 | Exhausted retries on ELS ADISC |
| 0X59 | Exhausted retries on ELS LOGO |
| 0X5B | Attempted ELS PRLI non-existent node |
| 0x5D | Exhausted retries on ELS PRLI |
| 0x63 | Attempt to issue command to fabric without a valid fabric login |
| 0x65 | Error issuing fabric command, Nameserver request status (reported as ELS command error status) aa with byte 0x11=aa. The Appendix has more information, see “ELS Command Codes” on page 64. |

**Table 8: Malfunction Errors (Continued)**

| Bits 0 - 7 | Interpretation |
|---|---|
| 0x66 | Invalid fabric command type |
| 0x6A | Invalid fabric command sub-type |
| 0x6C | Name server response error, CT command response bbaa with byte 0x11=aa, byte 0x12=bb. The Appendix has more information, see “CT Command Response Codes” on page 63. |
| 0x6D | Name server response error, FC-CT reject code aa with byte 0x11=aa. The Appendix has more information, see “FC-CT Reject Reason Codes” on page 64. |
| 0x6F | SCN registration failed |
| 0x71 | Received unsupported ELS command code aa with byte 0x11=aa. The Appendix has more information, see “ELS Command Codes” on page 64. |
| 0x76 | Invalid format for received PRLI |
| 0x83 | Node object-allocation failure |
| 0x9A | SCSI command error reported with SCSI STATUS of cc on Target aa LUN bb with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc. For more information, see “SCSI Status” on page 64. |
| 0xA2 | Generalized command context allocation failure |
| 0xA8 | Read check error, residual amount ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc |
| 0xAA | A node timeout occurred on DID ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc |
| 0xF0 | Spurious link attention |
| 0xF1 | Spurious link attention with previous state change |

**Table 9: Command Errors**

| Bits 0 - 7 | Interpretation |
|---|---|
| 0x32 | Insufficient context for attention handling |
| 0x49 | ELS command error aa with byte 0x11=aa. The Appendix has more information, see “FC-CT Reject Reason Codes” on page 64. |
| 0x4A | ELS command failure |
| 0x90 | ELS FDISC completed to DID ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc |
| 0x91 | ELS LOGO completed to DID ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc |
| 0x92 | ELS LOGO received from fabric |
| 0x93 | ELS FLOGI completed to DID ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc |
| 0x94 | ELS PLOGI completed to DID ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc |
| 0x95 | Discovered SCSI target wirh DID ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc |
| 0x96 | ELS RSCN of type aa received with byte 0x11 = aa |
| 0x97 | SCSI ID of cc assigned to SCSI target with DID of XXaabb with byte 0x11 = aa, byte 0x12=bb, byte 0x13=cc and XX not reported |
| 0x98 | Nameserver response with aa targets (number of targets) reported with byte 0x11=aa |
| 0x9B | SCSI Check Condition at Target ID aa with ASC/ASCQ of bb/cc with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc. The Appendix has more information, see “ASC/ASCQ” on page 65. |

**Table 9: Command Errors (Continued)**

| Bits 0 - 7 | Interpretation |
|---|---|
| 0xA3 | Local error on FCP command completion, received Local Reject to FCP command LOCAL REJECT STATUS of aa with byte 0x11=aa prior to leaving HBA |
| 0xA6 | Data over-run |
| 0xA7 | Non-specific FCP error (info in bits 8 - 31) |
| 0xA9 | Local error, received Local Reject to FCP command LOCAL REJECT STATUS of aa with byte 0x11=aa after leaving HBA. The Appendix has more information, see “Local Reject Status” on page 65. |
| 0xAB | CT Pass-through command SRB STATUS aa with byte 0x11=aa. The Appendix has more information, see “SRB Status” on page 65. |
| 0xAC | Local error on report LUN completion, LOCAL REJECT STATUS aa returned as during Report LUN completion with byte 0x11=aa. The Appendix has more information, see “Local Reject Status” on page 65. |

**Table 10: Event Indications**

| Bits 0 - 7 | Interpretation |
|---|---|
| 0x21 | Port re-initialization complete: now off-line |
| 0x22 | Port shutdown complete |
| 0x23 | Port re-initialization complete: now on-line |
| 0xA5 | Data under-run (residual in bits 8 - 31) |
| 0xD0 | NPIV Virtual Port creation success (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xD1 | NPIV Virtual Port creation failed (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xD2 | NPIV Virtual Port FDISC failed (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xD3 | NPIV Virtual Port memory allocation failed (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xD4 | Exceeded maximum Virtual Port supported (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xD5 | NPIV Virtual Port removal (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE0 | Authenticated successfully (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE1 | Failed to authenticate (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE2 | Authentication not supported (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE3 | Authenticated ELS command timeout (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE4 | Authentication transaction timeout (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE5 | LS_RJT other than Logical Busy received for Authentication transaction (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE6 | LS_RJT Logical Busy received for Authentication transaction (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE7 | Received Authentication Reject other than Restart (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE8 | Received Authentication Reject Restart (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |
| 0xE9 | Received Authentication Negotiate (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |

**Table 10: Event Indications**

| | |
|---|---|
| 0xEA | Authenticating spurious traffic (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc |
| 0xEB | Authentication policy has been changed (Virtual Port index ccbbaa with byte 0x11=aa, byte 0x12=bb, byte 0x13=cc) |

# Appendix

## Supplemental Event Log Information

The following information is designed to provide additional information that you might find useful in assisting your customers.

### Event Log Interpretation

- All events logged by Emulex Storport Miniport are in Event ID 11 with source "elxstor".
- The Storport Miniport driver parameter LogErrors determines what type of events are logged by the driver; the default setting is "3" which logs only events of a SEVERE nature; the optional setting of "2" logs events of both SEVERE and MALFUNCTION type; the optional setting of "1" logs events of SEVERE, MALFUNCTION and COMMAND type.

  **Note:** For troubleshooting SAN connectivity or device discovery issues, set the LogErrors to 1.

- The Emulex event code is found in byte 0010 and supplementary data is in byte offsets 0011 through 0013.

### Additional Event Log Information

The following tables are not comprehensive but do include those codes, which through Emulex's experiences in our support and testing environments, we feel are most likely to show up in SAN environments where problems occur.

#### ELS/FCP Command Error Status Codes

Internal firmware codes posted by the HBA firmware that explain why a particular ELS or FCP command failed at the Fibre Channel level.

**Table 11: ELS/FCP Command Error Status Codes**

| Explanation | Code |
|---|---|
| Remote Stop - Remote port sent an ABTS | 0x2 |
| Local Reject - Local Reject error detail | 0x3 |
| LS_RJT Received - Remote port sent LS_RJT | 0x9 |
| A_RJT Received - Remote port sent BA_RJT | 0xA |

#### CT Command Response Codes

Codes that indicate the response to a Fibre Channel Common Transport protocol command.

**Table 12: CT Command Response Codes**

| Explanation | Code |
|---|---|
| FC Common Transport Reject | 0x8001 |
| FC Common Transport Accept | 0x8002 |

## FC-CT Reject Reason Codes

Codes that indicate the reason a CT command was rejected.

**Table 13: FC-CT Reject Reason Codes**

| Explanation | Code |
|---|---|
| Invalid command code | 0x01 |
| Invalid version level | 0x02 |
| Logical busy | 0x05 |
| Protocol error | 0x07 |

## ELS Command Codes

Fibre Channel protocol codes that describe what particular Extended Link Services command was sent.

**Table 14: ELS Command Codes**

| Explanation | Code |
|---|---|
| Link Service Reject (LS_RJT) | 0x01 |
| Accept (ACC) | 0x02 |
| N_Port Login (PLOGI) | 0x03 |
| Fabric Login (FLOGI | 0x04 |
| N_Port Logout (LOGO) | 0x05 |
| Process Login (PRLI) | 0x20 |
| Process Logout (PRLO) | 0x21 |
| Discover F_Port Service Params (FDISC) | 0x51 |
| Discover Address (ADISC) | 0x52 |
| Register State Change Notify (RSCN) | 0x61 |

## SCSI Status

The SCSI status returned from a SCSI device which receives a SCSI command.

**Table 15: SCSI Status Codes**

| Explanation | Code |
|---|---|
| GOOD | 0x00 |
| CHECK CONDITION | 0x02 |
| BUSY | 0x08 |
| RESERVATION CONFLICT | 0x18 |
| QUEUE FULL | 0x28 |

## Local Reject Status

Codes supplied by the Emulex HBA firmware which indicate why a command was failed by the HBA.

**Table 16: Local Reject Status Codes**

| Explanation | Code |
|---|---|
| SEQUENCE TIMEOUT - Possible bad cable/link noise | 0x02 |
| INVALID RPI - Occurs when link goes down | 0x04 |
| NO XRI - Possible host or SAN problem | 0x05 |
| TX_DMA FAILED - Possible host system problem | 0x0D |
| RX_DMA FAILED- Possible host system problem | 0x0E |
| ILLEGAL FRAME - Possible bad cable/link noise | 0x0F |
| NO RESOURCES - Port out of exchanges or logins | 0x11 |
| LOOP OPEN FAILURE - FC_AL port not responding | 0x18 |
| LINK DOWN - Queued cmds returned at link down | 0x51A |
| OUT OF ORDER DATA - Possible bad cable or noise | 0x1D |

## SRB Status

SCSI Request Block status provided by the driver to the operating system based upon response from SCSI device in the SAN.

**Table 17: SRB Status Codes**

| Explanation | Code |
|---|---|
| ERROR | 0x04 |
| BUSY | 0x05 |
| TIMEOUT | 0x09 |
| SELECTION TIMEOUT | 0x0A |
| COMMAND TIMEOUT | 0x0B |
| BUS RESET | 0x0E |
| DATA OVERUN | 0x12 |

## ASC/ASCQ

Additional Sense Code/Additional Sense Code Qualifier information can be found in any SCSI specification document - these codes contain detailed information about the status/condition of the SCSI device in question.

## Additional Notes on Selected Error Codes:

These are error codes which may be seen more frequently than others or which indicate conditions that you might be able to solve by investigation and correction of problems in the SAN configuration.

**Note:** Nomenclature of 0x is used as the prefix for the byte code fields since those byte codes are actually hex values.

### Node timeout (code 0xAA)

This event code indicates that a particular device has not been found (if the message is logged during device discovery) or that a particular device has been removed from the fabric. If this message is seen, determine if there is something wrong with the connection of that device to the SAN (cables, switches or switch ports, status of the target device itself).

### SCSI Command Error (0x9A) and SCSI Check Condition (code 0x9B)

Code 0x9A indicates that the SCSI command to a particular device was responded to with an error condition (the target and LUN information, along with the SCSI status, are provided).

In the specific case of code 0x9B, this code indicates that the device responded with the specific status of Check Condition - the ASC/ASCQ information provided in bytes 0x12 and 0x13 will allow you to find out what status is being reported by the target and see if there is some action that can be performed to return the device to functional status.

### Nameserver Response (code 0x98)

This code is useful in determining if the expected number of targets in a SAN configuration are being presented by the nameserver to the requesting HBA. The number in byte 0x11 is the number of targets returned to the nameserver query made by the HBA - if the number of targets does not match expectations, examine the SAN configuration found in the switch tables and if that information shows targets or devices still missing, check connections between the switch ports and those devices.

### Context Allocation Failures

There are a number of event codes for which the interpretation contains the phrase "context allocation failure" - these types of events are referring to the internal memory constructs of the Emulex Storport Miniport driver and as such are intended for Emulex design engineer's information. If a customer encounters such an event, they should contact Emulex support for analysis and determination if that particular event may be an indicator of a failed HBA or of some problem with interaction between the HBA, the Emulex Storport Miniport driver, the host operating system and the host memory.

**Note:** Context allocation failures are rare.